TEST
EQUIPMENT
SCHEMATICS

Vintage Radio Identification SKETCH-BOOKS of D. H. MOORE

VOLUME VI

The Editorial Group, Ltd...

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DEDICATION

.....to a way of life
that should not have
been forgotten.

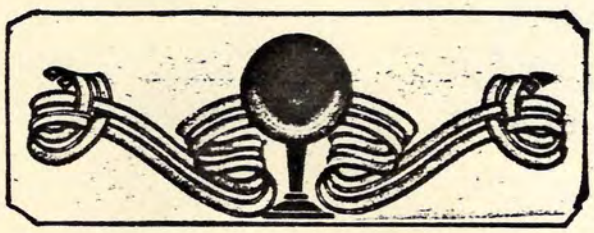
Acknowledgements

Bits and pieces of these volumes have been published, referenced, reviewed in several media devoted to the hobby of vintage Radio, including a few foreign countries, such as New Zealand, Japan, Canada and England. Such favourable notice for such a labour of love is hereby acknowledged in appreciation.

Thanks must also be offered Stan Lopes who tediously editted the technical authenticity of circuitry to be found in Volumes II through VII. His labours have resulted in an obvious authenticity, we feel, especially for those who delight in tracing out vintage schematics. He even found technical errors in original sources!

Special thanks are due Douglas G. Yule, who originally sponsored this effort as a contribution to the hobby, without whose prompting these Sketch-Books may not have come into existence. Also, thanks are given to Howard W. Granoff, of the OLDE TYME RADIO COMPANY, whose unflagging enthusiasm and publicity has done much to make these Sketch-Books known within the fraternity.

And in as much as fraternalism is the basis for shared enthusiasm, which is what any hobby is, and because of the original and dramatic shift away from the current vintage Radio fare, it follows that the publishers and the author, being human, would appreciate hearing from you, your comments, along with any suggestions you'd care to offer with an eye to producing bigger and better vintage Radio literature in future.



Vol. VI: Test Equipment

INTRODUCTION..... 1
A Modulated Oscillator..... 15A
Battery Operated Oscillator 15
Adelamn Universal Tester... 20A
CB Ohmeter , 1928..... 22
Commercial Equip. I.D..... 31
Compact Set Analyzer..... 38
Dry-Cell Charger & Tester.. 66

Early Ohmeter Circuits..... 21
Early Ohmeter Design..... 29

FERRET Test Speaker..... 39

Home-Brew Multi-Meter..... 30

JEWELL Set Analyzer..... 40
JEWELL #95 Set Tester..... 41

Mutual Conductance Tester.. 8

NA-ALD Tester Adapter 950.. 12
Neon-Lamp Condenser Tester. 46
99 Tube Tester..... 16

Oxide-Fil. Rejuvenator..... 17

RADIO CITY Multi-Tester 205 11
Reactivating Thoriated Tube 13
Rectifier Tube Tester..... 10
Resistance-Capacity Meter.. 28A
RB Rectifier Tube Tester... 9
RB Test Oscillator, 1927... 45
RB Test Oscillator, 1929... 46
Representative Test Equip.. 30A
RB Output Meter..... 44A
SHALLCROSS #681 V-O..... 23
SHIEPE Ohms-Caps. Tester.... 28
Short-Open-Good Tester..... 46
STERLING R-403 Instructions. 69
STERLING R-410 Tester..... 68
STERLING R-510 Rejuvenator.. 19
SUPREME Equip. I.D.Numbers.. 48
#60 Test Oscillator..... 49

#61 Test Oscillator..... 50
#111 Test Oscillator..... 51
#180 Test Oscillator..... 52
#385 Test Set Analyzer... 54
#551 V-T-V-M..... 65

Testing Screen-Grid Tubes... 15
Tester I.D. Sketches..... 68
TOBE Condenser Analyzer..... 36
Tube Tester Notes..... 4
Tube Emission Tester, 1926.. 14

WESTON #663 V-O..... 24
WESTON #694 Test Oscillator. 44
WIRELESS EGERT 99 Oscillator 43

WORKRITE J-245-X Instruction 26
WORKRITE J-245-X Tester..... 25
WORKRITE #553 Test Oscillator 28

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INTRODUCTION

Test-equipment was a pre-occupation of engineers even before the days of the spark-gap transmitters. During the early Twenties very little was accomplished, and what was designed and produced for the serviceman or home-constructor was inferior and unreliable.

Practical test gear began to enter the marketplace around 1925, aimed specifically for the emerging radio serviceman, pioneered by such new companies as General Radio, Sterling, Workrite, Flewelling, Day-Fan, and such. Then came a veritable explosion in test-equipment up through the early Thirties, and most of it good.

Voltmeters and ammeters had been around since the days of electricty, but the ohmeter was the most popular item with servicemen. Most were limited in their capability and many were inferior in workmanship and materials. Many an ohmeter was "blown" on the first application, due to the low internal resistance per volt.

By 1929 superior ohmeters were being offered at 1000 ohms per volt, which was quite an advance. Among the better makes were an assortment of designs by Weston, Jewell, Shallcross, Gen-Rad, with a very fine line offered by Supreme, headed-up by Laughter, one of the early editors of Gernsback who went on to bigger and better things.

Probably the most popular test items were the so-called tube rejuvenators, or tube re-activators. The nature of these units may be gotten from their price range - $3.65 to $15. Tube rejuvenators were offered by Sterling, Mack, Acme, IRC, Mastercraft, Remo.. not to mention a few fly-by-night operators. All circuitry employed was essentially the same, and when they worked, they worked well or they didn't work at all. Yankee and Flewelling produced neat little tube rejuvenators covering all of the tubes that could be rejuvenated; some units were limited to only a few.

The principle employed by all tube rejuvenators was that the filaments were over-heated for a specified period, then "baked" for a longer period. Among the adverts of the period one can always find offers to "restore your tubes for 50¢!"....some offers were as high as $2.50, which, when you consider the price of tubes at that time, was a bit out of line for most home-constructors.

In the following pages you will find instructions of operation as well as constructional details of some of the early tube rejuventaors. My own experience seems to have parallelled that from the Twenties - that is, sometimes good results, sometimes not.

The testing of capacitors and condensers baffled engineers for a long time, due chiefly to the type of construction employed and materials used. The advent of the dry electrolytic, pioneered by Dubilier and Elkon, was quite an advance, and simplified testing. There was a rash of capacity-testers, briefly, with the usual mixed results but undoubtedly the best unit of the period was that manufactured for the Tobe people in 1929; very elabourate, very effective. The unit is detailed herein, and can be easily constructed: it will work equally effectively with modern capacitors.

The dream of designing a universally applicable multimeter was a bit longer in being realised. Some rather weird configurations appeared, as well as thoughtful designs. From the multimeter it was a logical step to the set analyser, which combined all the functions of the voltmeter, ammeter, capacity tester, tube tester, tube rejuvenator, signal tracer, signal generator, test oscillator - and, it was no contest to say that Supreme, of Greenwood, Mississippi, led the field.

(Parenthetically, it might be mentioned that there's still Supreme Electronics in Greenwood today, an outgrowth of Laughter's operation, but they are extremely reluctant to talk about those glory days of Supreme Instruments.)

The obvious superiority of Supreme test equipment lead to the national establishment of a "Supreme Serviceman League", complete with wall-certificate and lapel button, a facsimile of which is shown in Volume I of these Sketch-Books. This was still the era of "belonging" to some select or special-interest group, and letting the world know it with certificates and buttons. This was before the mania for bumper-stickers and vanity-plates, but such would undoubtedly been in vogue, also.

When Supreme Instruments passed into other hands midway in the Thirties, the new management abandone Supreme's traditional golden oak cabinets and elabourate Bakelite panels in favour of the art-deco styling rushing into vogue - probably one of our ugliest periods of industrial design, unhappily still with us. The new packaging lost Supreme's edge in the marketplace, of course - just as the Packard motor-car lost something when it abandoned its long-time grille.

The best of the set analysers was undoubtedly the Supreme Model 385, from which their Models of the 400 and 500 series evolved. If you have a working model of any of these, you really do not need a seperate piece of test gear for any function to service your vintage radio. Full details of the Model 385 are contained herein.

The theoretical soundness of some early test equipment can be easily demonstrated simply by your constructing them, even using modern components - which would probably improve performance, anyway.

I have constructed several and all work quite well, and are in use as I find it fascinating to use test equipment from the same period on a vintage radio I happen to be working on. This emphasises the personal relateability of the game that made Radio a sociological phenomenon.

It would also appear that the bigger-is-better syndrome is not a new phenomenon, as in 1927 Jewell offered the established serviceman a most elebaourate test-bench configuration, consisting of the usual bench, with a 3'x4' backboard, 28 meters, 32 switches, a jungle of leads and clips, and provisions for a test speaker. It turned out to be commercially unfeasible, but it worked.

One will occasionally see vintage test equipment at a flea-market or swap-meet, and it is rarely bought. When I naturally sought to learn why, it turned out that most people simply did not recognize the item for what it was, or what it was designed to do.Also of course when such as Rider's does show a schematic of early test equipment it is usually incomplete and quite unrelateable. However, there is little to be found of test gear in the usual references, which make this volume at least different.

The schematics of commercial test equipment detailed herein are the result of my tearing down such equipment and tracing out or building the circuitry. And then, of course, making use of the reconstruction, and reliving the probable experiences of early constructors with all the attendent excitement and satisfaction when it worked.

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TUBE TESTER NOTES

In the conventional vacuum tube, electrons are emitted from the heated filament much like steam evapourating from heated water. The electrons are attracted to the plate because B+ keeps the plate positive with reference to the filament. When measured by a milliammeter it indicates the emitting ability of the filament, which is a good index of a tube's condition.

A filament gradually loses its emission in service, as the free electrons are "boiled" away. This loss is permanent in oxide-coated filaments, in such tubes as:

24, 26, 27, 45, 11, 12, 00, 80 and 81.

If an emission check of such tubes is not up to standard (see Table), the tube should be discarded.

Thoriated tungsten filaments may be paralyzed by overload due to lack of surface thorium, but this lack can be supplied by re-activating the filament with a slight filament over-charge voltage, without plate or grid voltage being applied. Such tubes would be:

99, 12A, 01A, 00A, 20, 40, 71A, 10 and 50.

Three general methods were utilised in the Twenties and Thirties by manufacturers of tube testers and re-juvenators:

1. A tube was acceptable if the plate current, read on an ammeter, reached a certain minimum value when a specified voltage was applied to the junction of plate and grid, tied together; and a specified voltage was applied to the filament.

2. A tube was acceptable if the filament voltage did not exceed a specified minimum in order to cause a specified grid current.

3. A tube was acceptable if a reversal of grid connexions caused a difference in the plate current reading.

The first method was recommended by the I.R.E., and required the plotting of a curve of filament emission. The minimum mA readings for plate current and filament and plate voltages are shown in the following Table, for this method:

NOTES ON TUBE TESTERS (Sht. 2)

Tube:	Fil. Volt.	Volt. To Plate & Grid Junction	Plate mA:
11-12	1.1	50	6
99	3.3	"	5.5
120	3.3	"	13
01A	5	"	20
00A	5	"	14
40	5	"	14
12	5	"	45
71A	5	"	40
26	1.5	"	35
27	2.5	50	35
10	6	100	85
13	4	100	40
16B	6	125	85
80	5	80	100
81	7.5	150	200

NOTE: Such readings cannot be taken on the 12A tube.

The second method listed above required insertion of a VM and mAM in the filament circuit and grid circuit, respectively. With minus 3V on the plate, the filament rheostat was adjusted to a 3 or 5 mA reading, depending on the tube. VM readings should not have been greater that the following:

Tube:	11-12	99	20	01A	00	12A	71
Grid Current	3	3	3	5	5	5	5
Max. Fil. V,	1	2.9	2.8	3.9	3.9	3.5	3.7

The third method was used by most commercial tube-checker manufacturers. A VM was inserted, along with a rheostat, in the filament circuit and a mAM so arranged that readings could be taken when the grid connexions were normal, and when they were reversed. If the two readings were different, they indicated that emission was occuring. The magnitude of the difference measuredthe mutual conductance of the tube.

This method also gave an indication of gas in a tube, its presence being indicated by a reversed grid current when the grid was negative. A typical mutual conductance tube tester was the General Radio Type 443 of 1927, the schematic of which is shown, for which I must thank Arthur Hobart.

The prevailing theory behind early tube testers was based

NOTES ON TUBE TESTERS (Sht.3)

upon the following proposition: when a vacuum tube is used as an amplifier with a constant plate current, any change in the input grid voltage causes a corresponding change in the output plate voltage. The ratio of these changes is the amplification factor of the tube, designated by the Greek letter μ, and rendered conventionally as mu. This is a constant.

Tubes in common use during the Twenties had a mu of from 3 to 9, with the screen-grid tubes having a mu of 420. Mu was numerically equal to the change in plate voltage caused by a 1-V change in grid potential when the plate current was maintained at a constant value.

The mu of a tube, therefore, was equal to the maximum amplification which the tube was capable of producing, which in turn depended upon the structure of the tube, and was practically independent of operating voltage. While I doubt that there are too many vintage radio buffs who are really interested in plotting the mu of a vacuum tube. I append the traditional formula:

$$\text{Volt. Amp.} = \frac{\text{Amp. Factor X Ext. Imped.}}{\text{Plate Resist. + Ext. Imped.}}$$

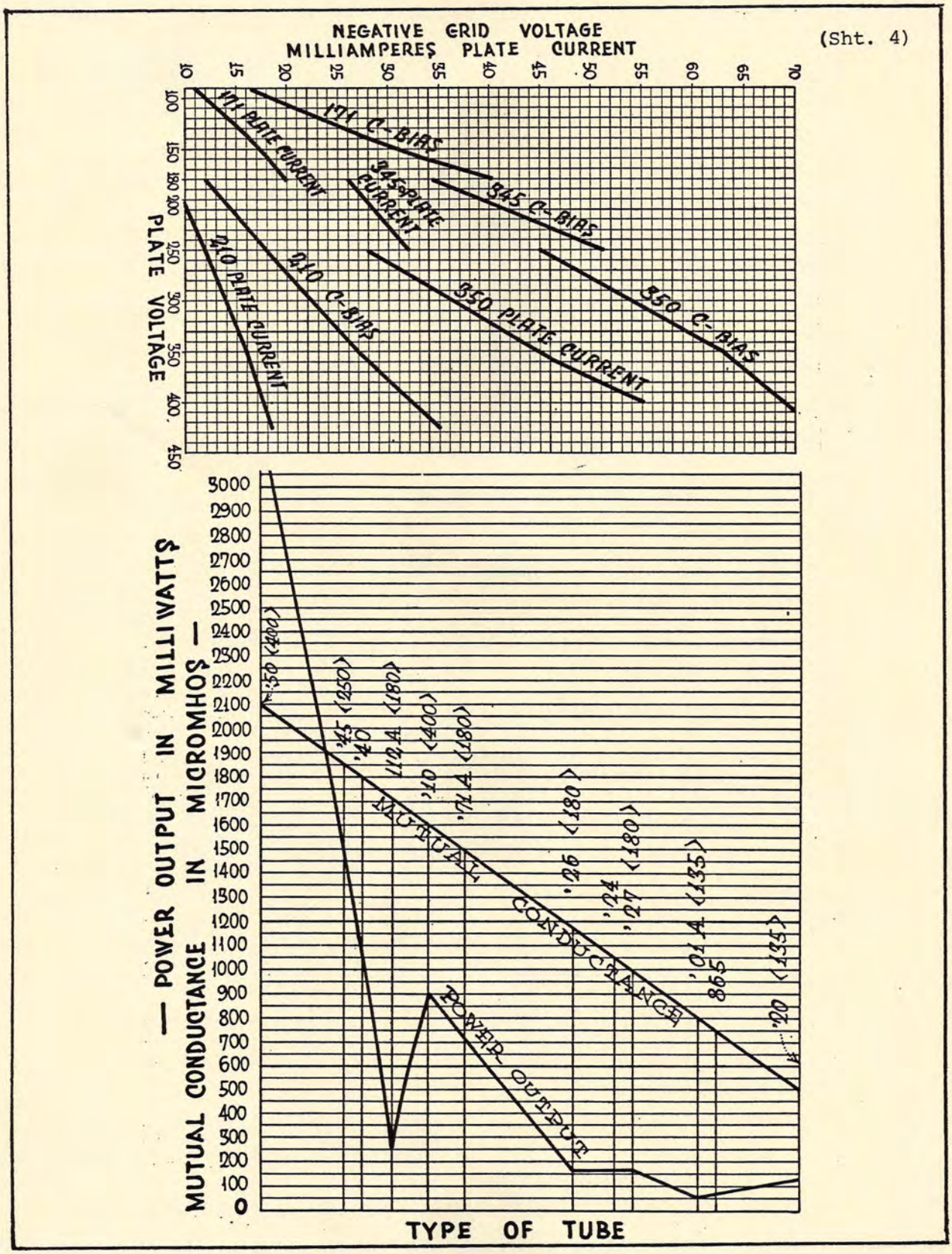
The ratio between the Amplification Factor and the Plate Resistance was the mutual conductance of the tube, ranging from 200 to 2100. Since conductance is the reciprocal of resistance, the ratio is expressed in micro-mhos. The 01A, for example, had a mutual conductance of 700 micro-mhos.

The General Radio mutual conductance tester shown over-leaf was essentially an oscillator and a bridge circuit. Output from the oscillator was impressed across R1 and R3, being adjusted until the voltage drops across R1 and R3 were the same, indicated by minimum signal in the phones. The ratio of plate mA to grid voltage was then equal to R1, R2, R3, if the resistance of R3 was negligible, as compared to that of the plate resistance. By calibrating R1 in micromhos, it was possible to get a direct reading, $\pm$ 5%.

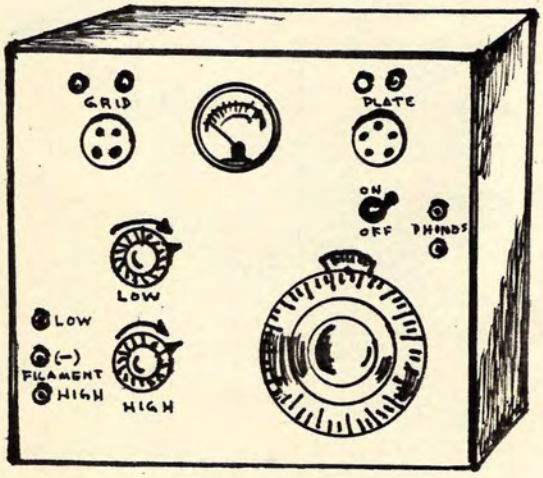
The appended chart gives the mutual conductance of a few of the more standard tubes of the period, as well as their corresponding power output for plate voltage (in parenthesis).

NOTES ON TUBE TESTERS

(Sht. 4)

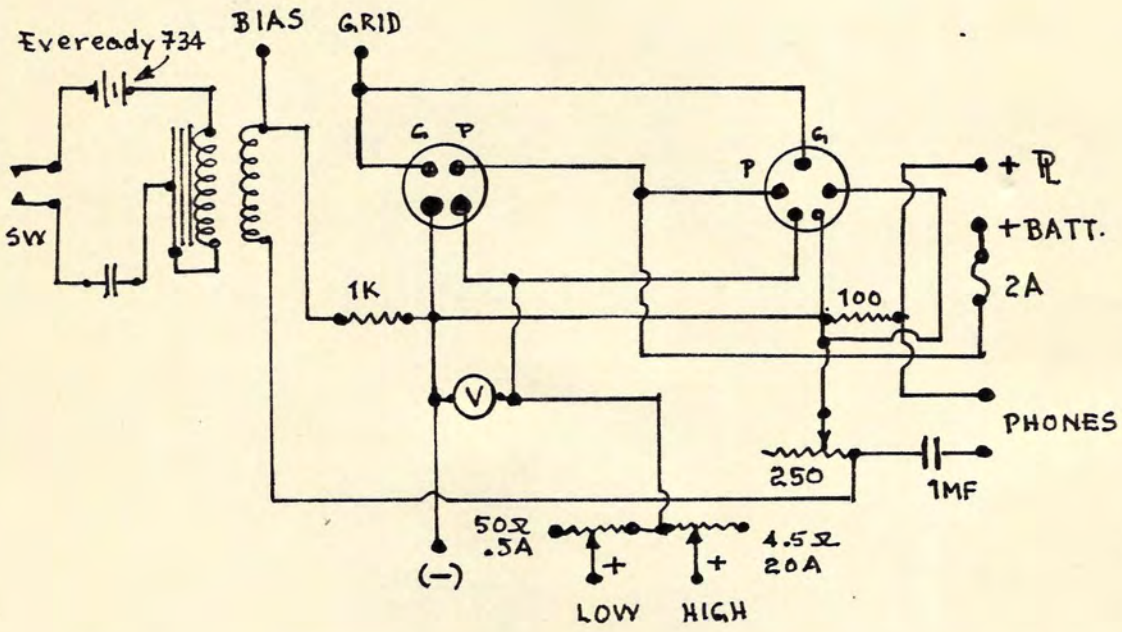

NEGATIVE GRID VOLTAGE
MILLIAMPERES PLATE CURRENT
10 15 20 25 30 35 40 45 50 55 60 65 70
100 150 180 200 250 300 350 400 450
PLATE VOLTAGE
111 PLATE CURRENT
171 C-BIAS
945 PLATE CURRENT
945 C-BIAS
950 C-BIAS
950 PLATE CURRENT
210 PLATE CURRENT
210 C-BIAS
— POWER OUTPUT IN MILLIWATTS —
— MUTUAL CONDUCTANCE IN MICROMHOS —
3000 2900 2800 2700 2600 2500 2400 2300 2200 2100 2000 1900 1800 1700 1600 1500 1400 1300 1200 1100 1000 900 800 700 600 500 400 300 200 100 0
(2051) 45
(2051) 54
(1614) 47
(1614) 47
(1614) 47

MUTUAL CONDUCTANCE TUBE TESTER,
(A G.R. Design, #443.) 1929



NOTES:

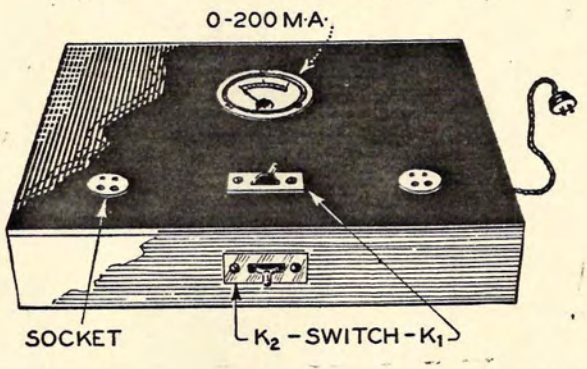
1. For 4- & 5-prong tubes to 250 mA Plate current.
2. Dial calibrated in Micromhos.
3. DC VM for FIL voltage only.
4. Accuracy = 5%.
5. Tune tube for maximum hum (true null balance unattainable at that time).

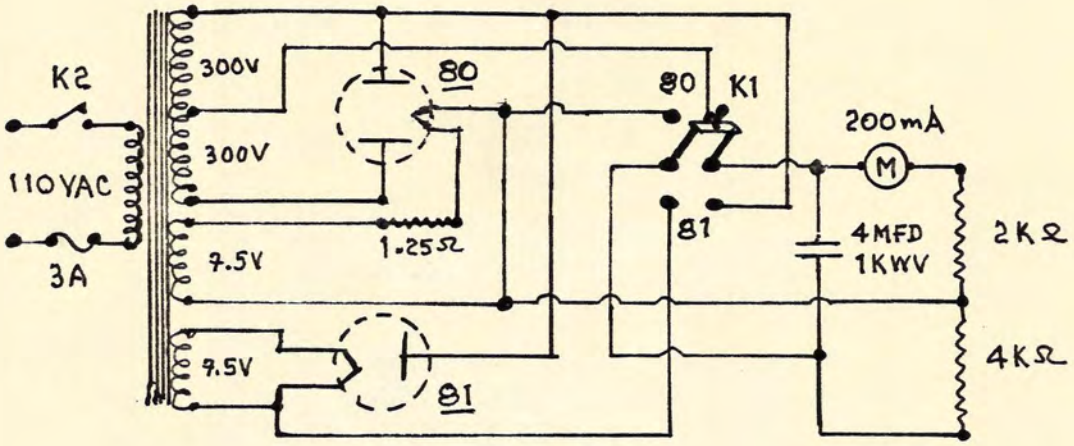


CAUTION! Always check tube for shorts first.

(R 11-29)

R.B. RECTIFIER TUBE TESTER, 1929





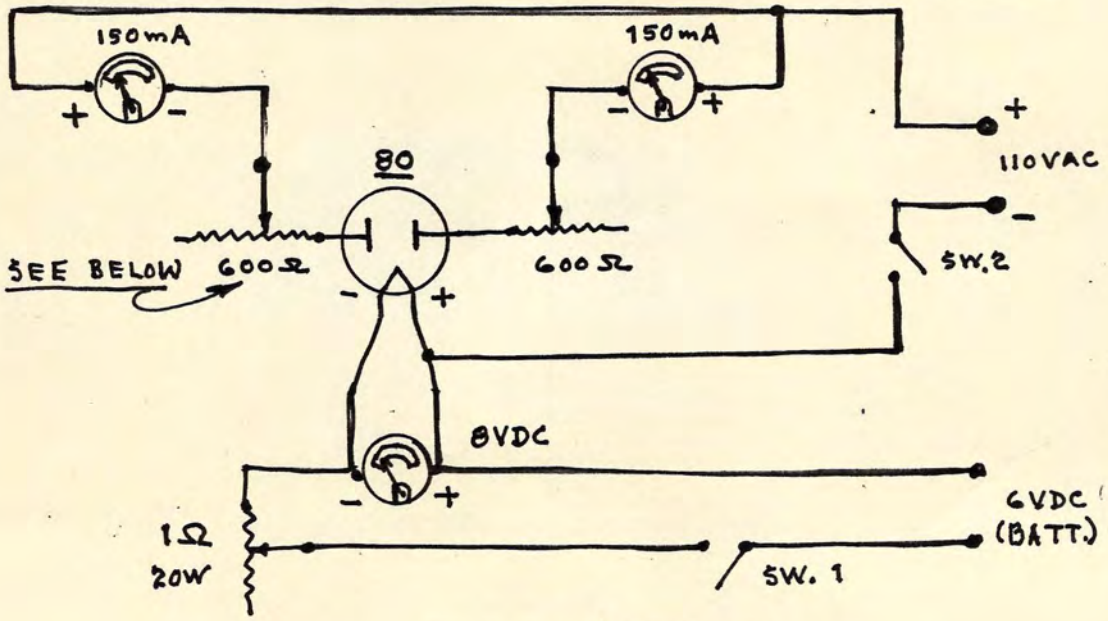
AMERTRAN
PF 52A XFRMR.

With 81 tube inserted and K1 thrown to 81 position, meter should read 60 mA, or better. The 80 tube should read 100 mA, or better. Meter reading can be raised 1- mA if H.V. is 700 VAC.

Resistor in 80 filament leg is 1¼-ohm, to reduce 7.5V to 5V. If transformer has a 5V winding, omit resistor.

(RB· 1-30)

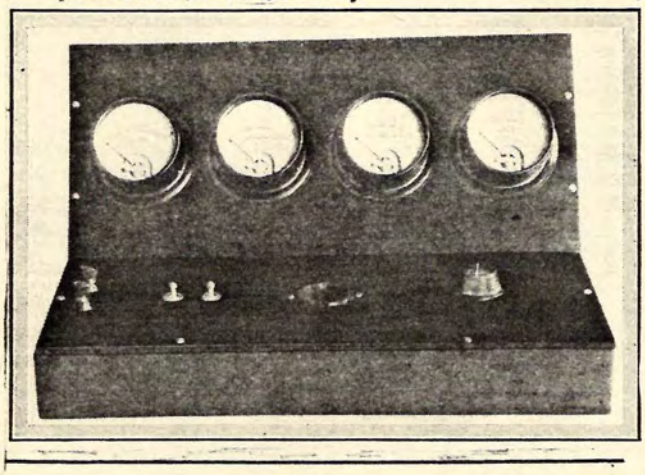
RECTIFIER TUBE TESTER, 1929



FOR 80 & 81 TUBES

(1 DUMMY METER)

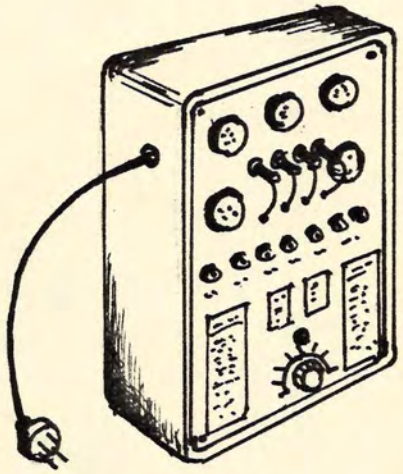
Panels 7"x16" (BAKELITE)



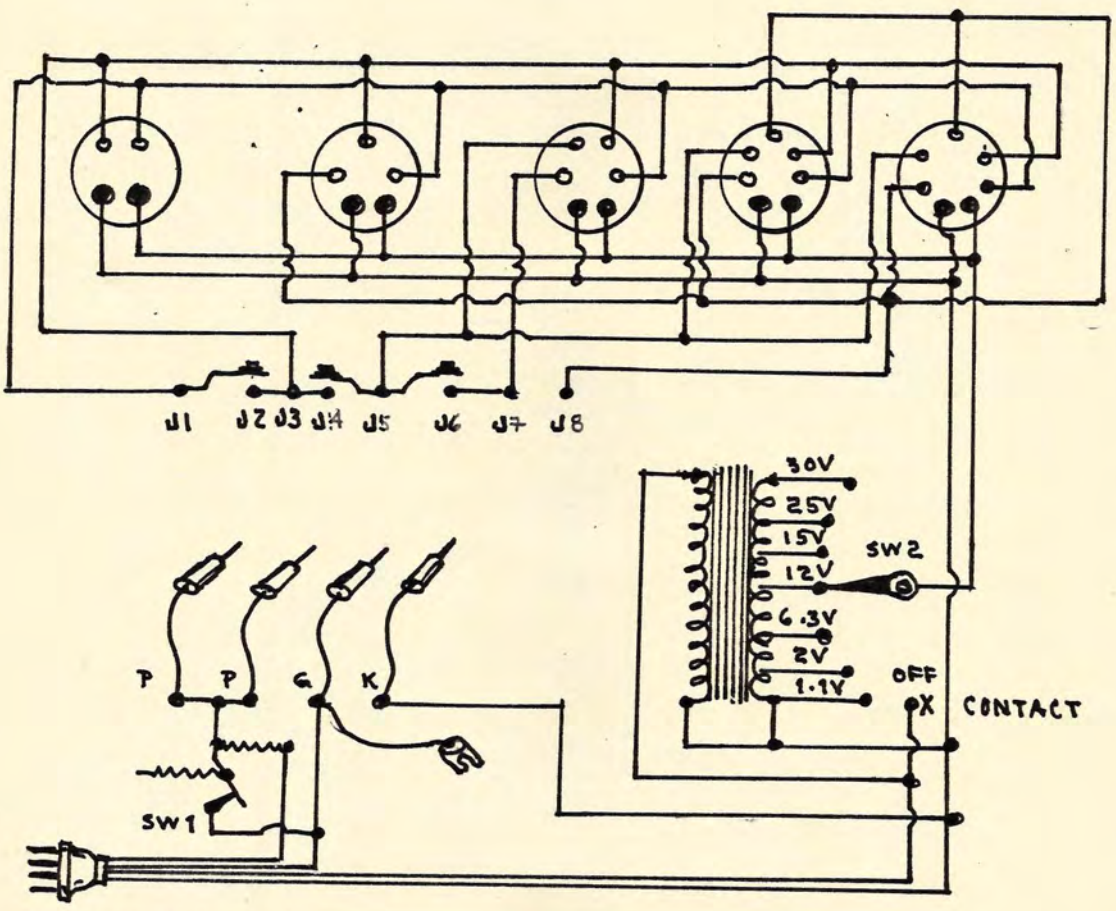
NOTES:
1. B- 7.5 resistor with sliding tap, matched to 600-ohms.
2. Gas content in envelope indicated by a blue haze - which will persist.
3. If both mA readings are low, reject tube.
4. If differenec between mA meters is 10 mA, or more, reject tube.
5. This unit tests for FILAMENT EMISSION only.

(CB Sum.-29)

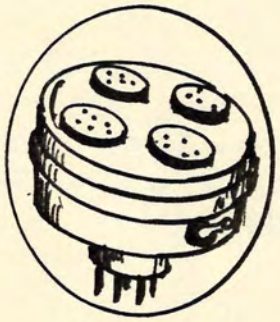
RADIO CITY SUPER-MULTIPLIER TUBE TESTER - Model 205

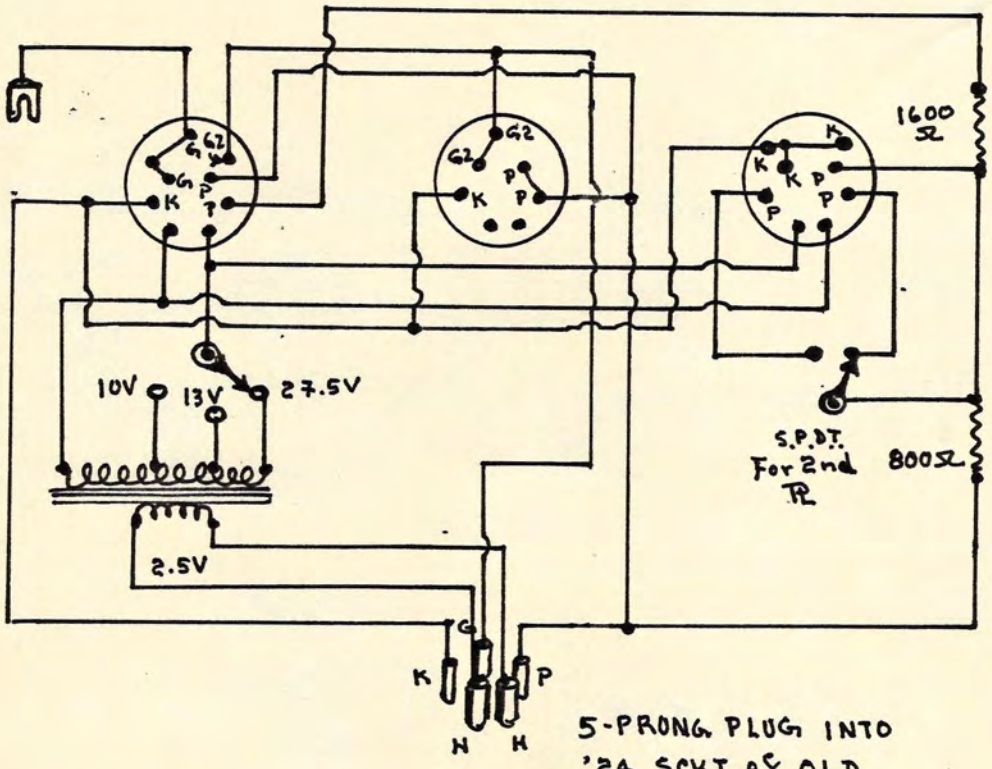


1. Tests all tubes as TRIODES.
2. SW 1 cuts in resistor to reduce TP current to a safe level when meter goes off scale.



NA-ALD 950-TR TUBE TESTER ADAPTER FOR OLD TESTERS





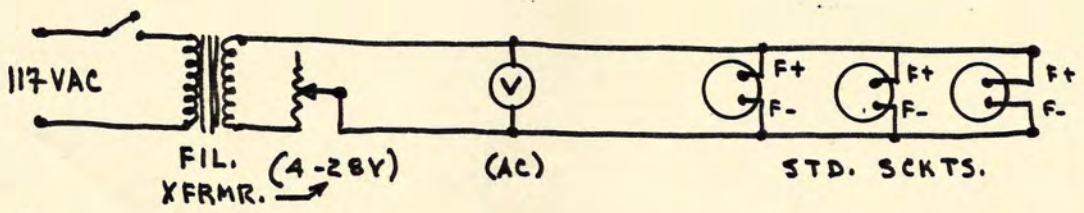
5-PRONG PLUG INTO '24 SCKT OF OLD TUBE CHECKER.

WILL TEST 12Z3, 14, 17, 18, 25Z3, 25Z5 (each TR), 43, 48, 96, 262A, 272A, A22, A28, A30, etc., TUBES WITH EARLY TUBE TESTERS NOT EQUIPT FOR HIGH FILAMENT VOLTAGE TUBES (Heater-type).

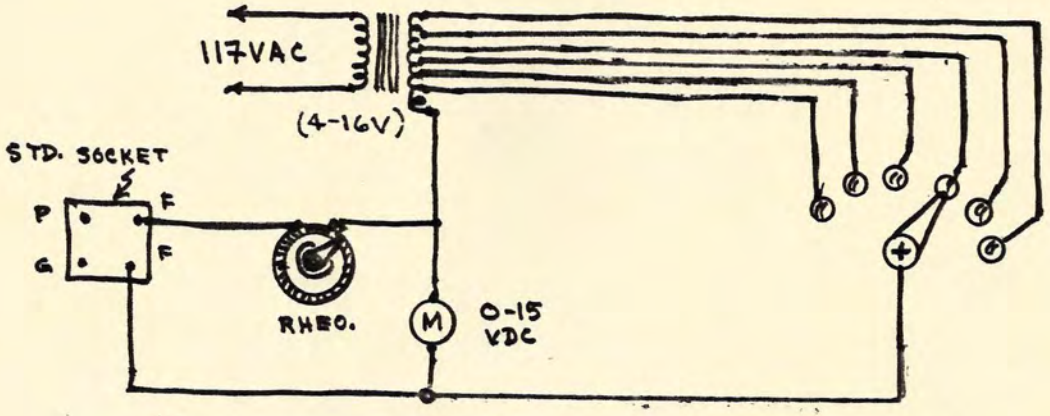
REACTIVATING THORIATED TUBE FILAMENTS

NOTE: Tubes such as UV200, WD-11, WD-12, UV201, etc., cannot be used with this unit.

USE one or more rheostats to reduce meter reading to 3.6V for 99 tubes; 5.5V for 01A. (The '01 tube is not the same as the '01A tube.) Leave the meter running continuously with tubes. Leave tubes at stated voltage for 2 hours. If unsatisfactory after testing, return tube to unit for 5 hours, with 15 hours maximum. If tube fails after 15 hours, chuck it.



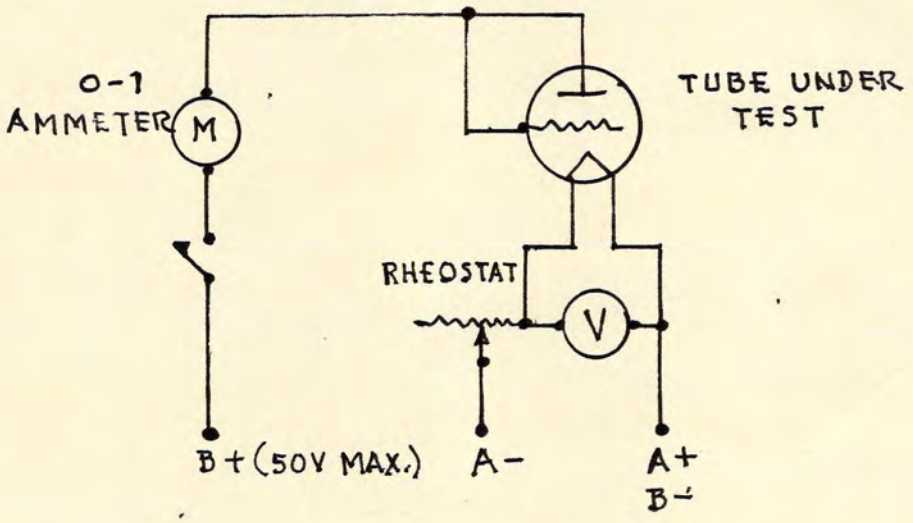
REACTIVATING OXIDE TUBE FILAMENTS



(Step-down or toy-transformer may be used.)

FLASHING (1st STEP)			AGING (2nd STEP)		
Tube	FIL Volt.	Time	Tube	FIL Volt.	Time
199	10	30 sec.	199	4.5	10 min.
01A	15	1 min.	01A	7.5	10 min.
120	10	1 min.	120	4.5	10 min.

TUBE EMISSION TESTER, 1926



PROCEDURE:

1. Insert tube and adjust FIL voltage to suit.
2. Throw switch, ignoring change in FIL reading.
3. MOMENTARILY increase FIL voltage to original setting.
4. If plate voltage increases more than 0.2 mA, filament is not fully active.
5. If plate voltage is less than 0.2 mA, tube is good.

NOTE

Without a "C" battery, 67.5V B+ is the maximum safe load for 99 & 01A. Tubes such as 11,12,300, cannot be re-activated; the 12A can.

6. Tubes which have been but slightly over-loaded may be restored by burning them at a slight over-voltage on the FIL an HOUR AFTER B-voltage has been disconnected - e.g.:

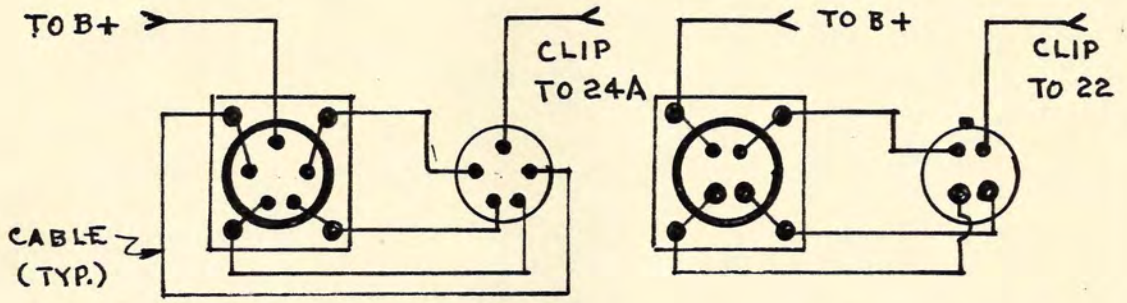
99 & 120 at 4V	01A, 71, 300A at 7V
10 at 9V	16-B at 9V

FLASHING: Burn FIL for 10-20 seconds at 12V for 99 & 20 tubes; 18V for 01A, 71, 300A.
Then burn FIL for 30 minutes at the voltage specified above. If emission is not restored, continue burning for 2 hours, taking an emission reading every 30 minutes. If emission does not come up, chuck the tube.

NOTE

A good voltmeter is essential. Most rejuvenators used excessive voltages, thereby shortening tube life.

TESTING SCREEN-GRID TUBES WITH EARLY MODELS OF TUBE TESTERS, 1929

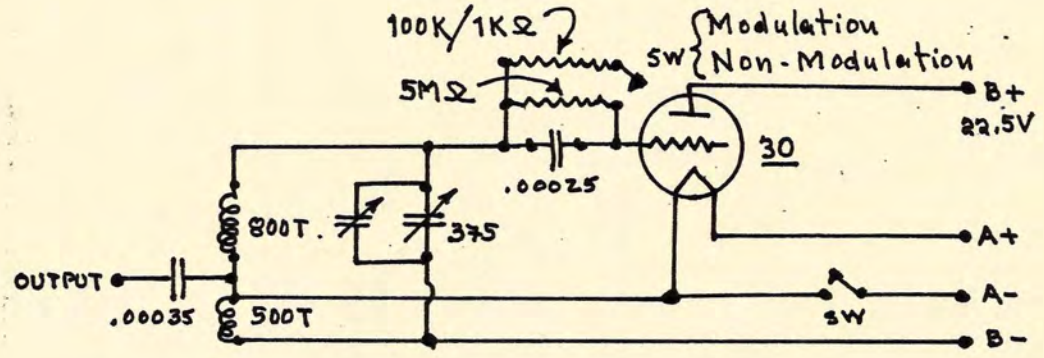


DC S.G. TESTER (2.5V FIL)

AC S.G. TESTER (3.3V FIL)

PROCEDURE:
1. Place tube base in tube-tester socket.
2. Place tube to be tested in extra socket.
3. Connect clip to control grid.
4. Connect clip to B+.
5. Test tube in usual manner.
6. One-third of the applied plate volate is right.

BATTERY OPERATED TEST OSCILLATOR



COIL MAY BE 20mH SMALL HONEYCOMB RFC, 1"ø ±.

A MODULATED OSCILLATOR, 1929

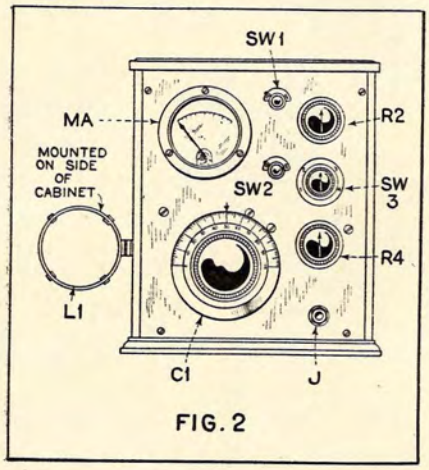
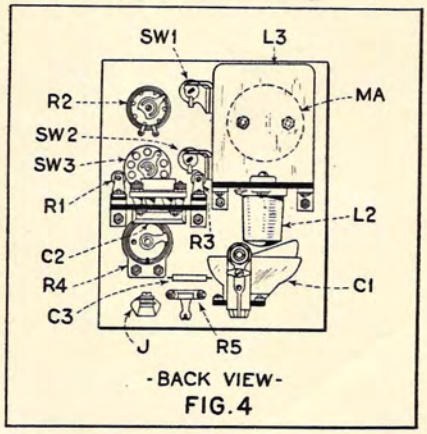
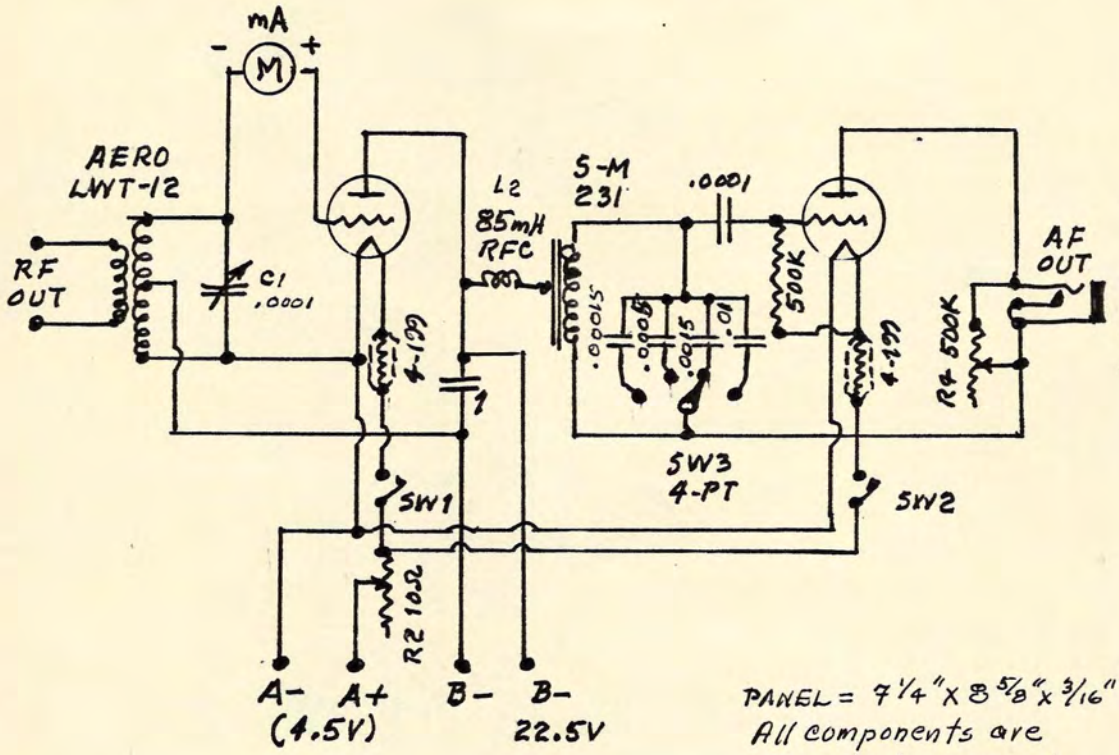


FIG. 2



-BACK VIEW-
FIG. 4

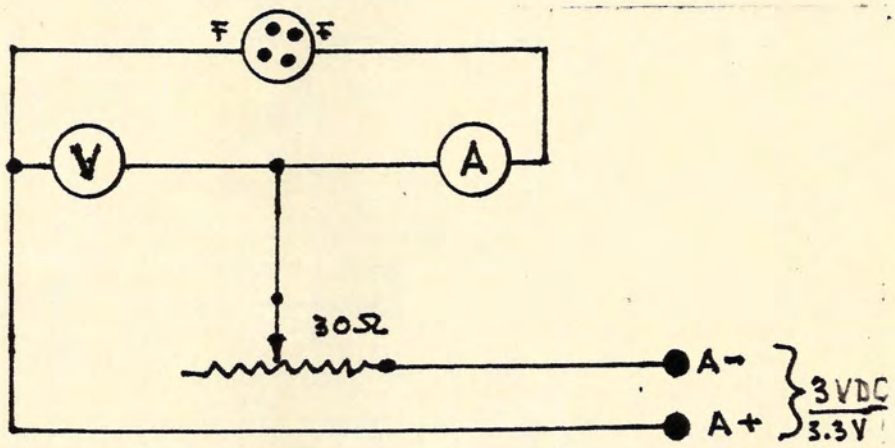


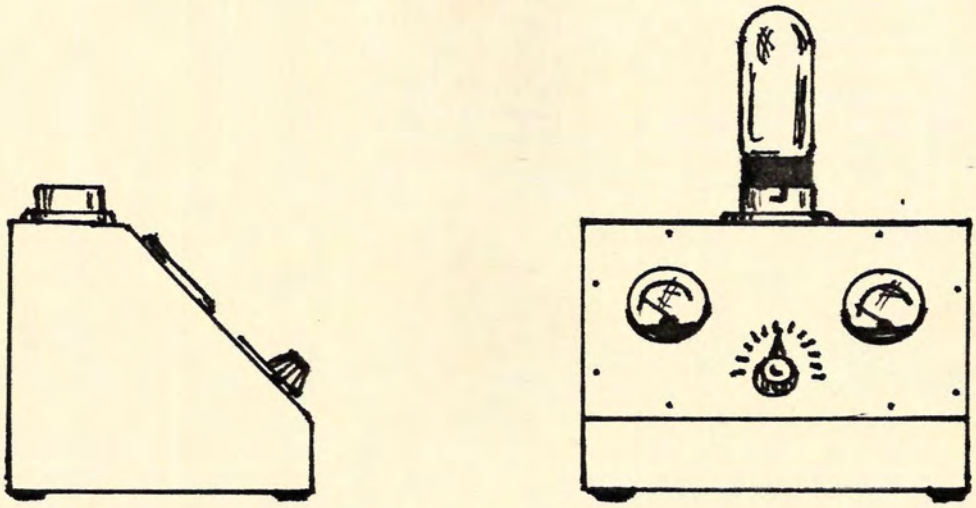
PANEL = 7 1/4" X 8 5/8" X 3/16"
All components are mounted on panel.

Cabinet to suit.

(RE 12-28)

99 TUBE TESTER (.064A ONLY),1923





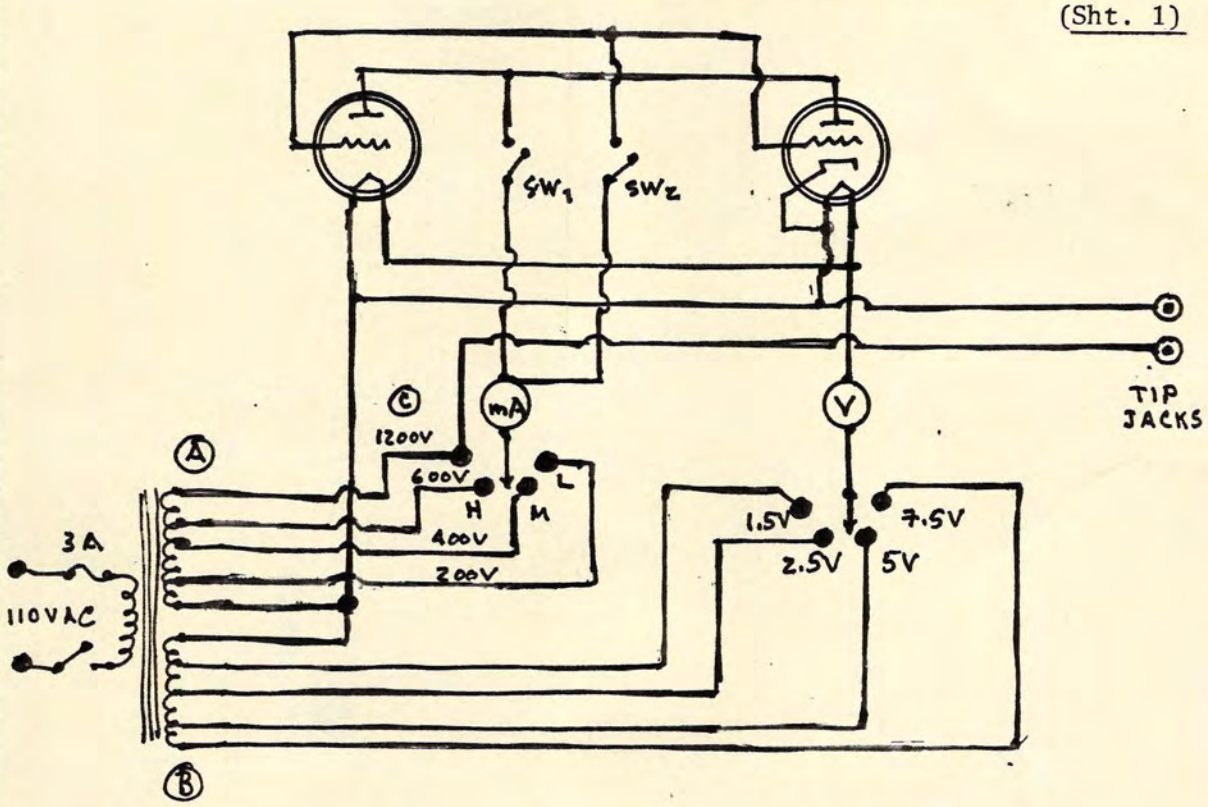
UNIT TESTS FILAMENT CONTINUITY ONLY.

Panel = 7½" x 6" x .195". V = 0-10 Voltmeter
A = 0-100 Ammeter

Filament current should read .60 to .063A w/ 3VDC applied to filaments. If such readings can be obtained w/ 2.9VDC, you have an excellent tube.

OXIDE-FILAMENT TUBE REJUVENATOR

(Sht. 1)



(A) = 1,200 VAC output (SEC). (B) = 7.5 VAC SEC winding.
(C) = not brought out to panel. S1, S2 = single blade knife-sws.

TABLE OF APPLICATION

Type	FIL V.	G/PL. flash V.
12A	5	200/400
71A	5	"
26	1.5	"
30,31	2.5	"
45	2.5	400
50	7.5	400/600
32	2.5	200/400

(NOT FOR 12 & 71!)

For 27, 24A, 35, 51 tubes apply 5V for approx. 5 minutes; then test before applying plate voltage.

Some 80 tubes will respond when one plate shows full emission.

Most tubes will show a blue-green hue when reactivated properly.

For procedure for flashing, refer to Sht. 2.

OXIDE-FILAMENT TUBE REJUVENATOR, Sht.2

PROCEDURE FOR FLASHING:

1. Time required for most tubes is from 10 to 30 seconds flashing time. (*)
2. Do not flash HV to where plate turns red.
3. Begin flashing at 1½ times the tube's normal plate voltage, and raise by steps to 2 or 2¼ times normal.
4. Heater-type tubes of the 2.5 VAC group should be given 5V on the filament from 30 seconds to 3 minutes, then tested. If not o.k., flash, while keeping 5V on the filaments.
5. First flash the grid by pressing Switch SW2 several times; then flash the plate with switch SW1 in the same way.
6. When proper colour is reached, press both switches simultaneously a few times; then test tube.

(*) This time span applies only to this tube rejubenator; other tube rejuvenators of the same period used varying times, depending upon the circuitry employed.

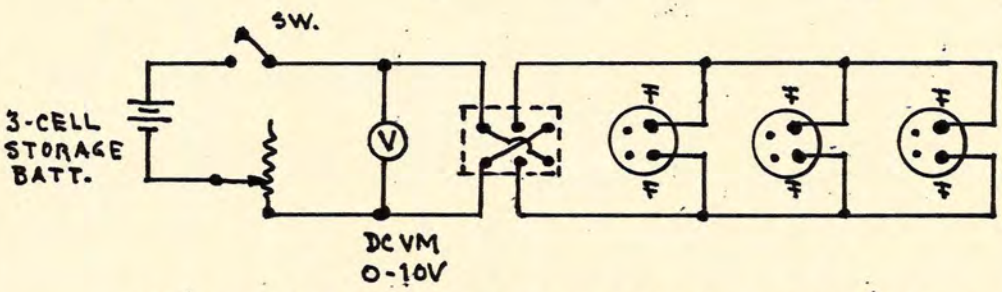
PROPER COLOUR = a bluish-green hue inside the envelope.

Panel = 7" x 8"

(2) 4-Point Rotary Switch

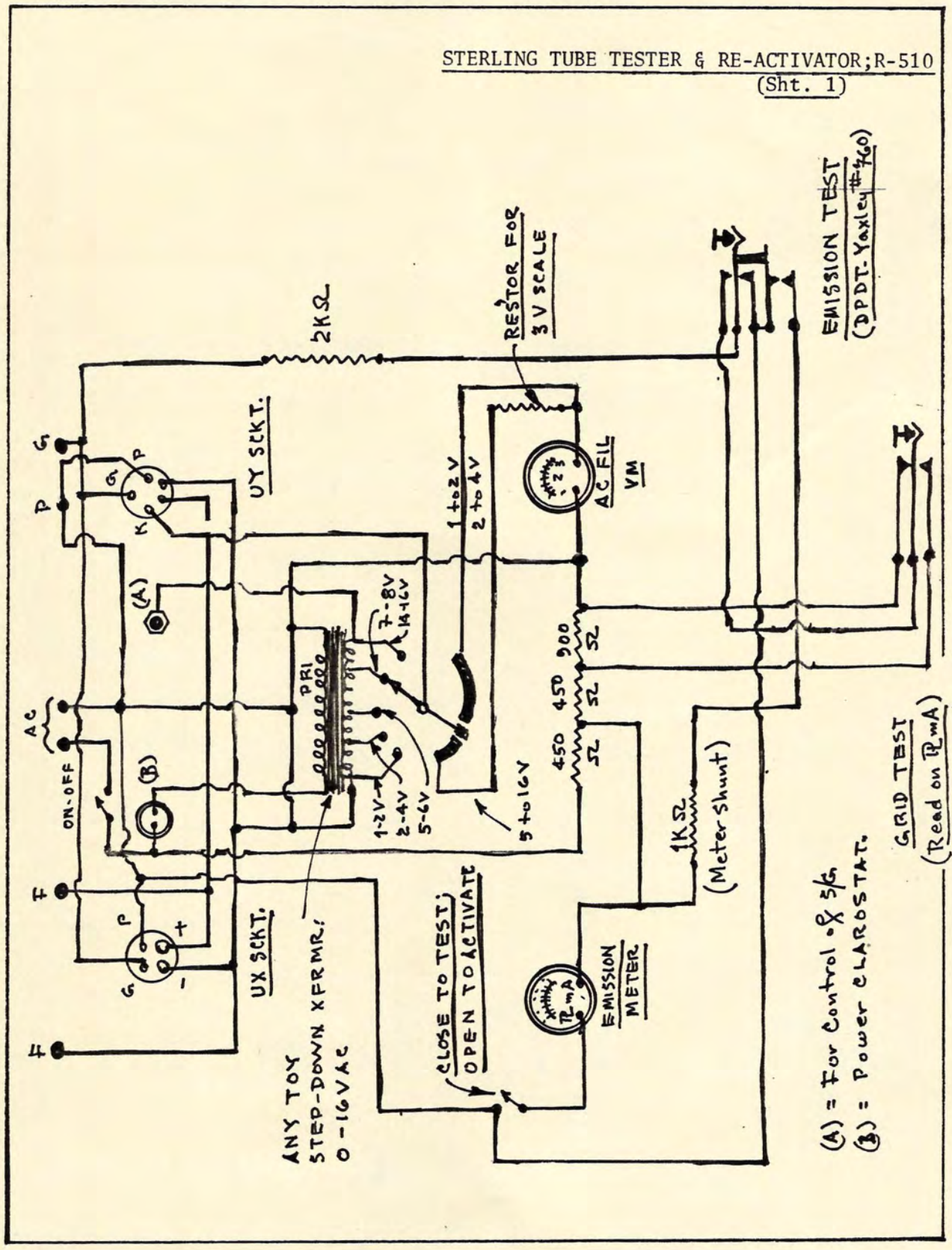
AC Voltmeter = 0-7.5V

AC mA = 0-150 mA.



TO CHANGE POLARITY WHEN USING A STORAGE-BATTERY.

STERLING TUBE TESTER & RE-ACTIVATOR; R-510
(Sht. 1)



STERLING TUBE TESTER & RE-ACTIVATOR; R-510
(Sht. 2)

PROCEDURES:

1. Turn on current; set desired voltage.
2. RH switch at "ON"; LH switch to "REACTIVATE".
3. Insert tube. Time flashing exactly 30 seconds, then shift lever to aging voltage and adjust Clastat.
4. Age tube 10 minutes.
5. If tube does not come up in 10 minutes, continue aging for 20 minutes to one hour.

TO TEST SCREEN-GRID TUBES:

1. Move switch to "TEST" position, and note plate mA.
2. LH lever to "GRID TEST" position; note plate mA.
3. Subtract one reading from the other. The greater the difference, the better the tube.

* * *

Tube Type	FIL Volt.	FIL Emiss.	Flash Volt.	Aging
99	3.3	15-25	12	4
20	3.3	20-30	12	4
01A	5.0	40-60	16	7
00A	5.0	40-60	16	7
40	5.0	40-60	16	7
71	5.0	50-70	16	7
10	7.5	40-70	16	9

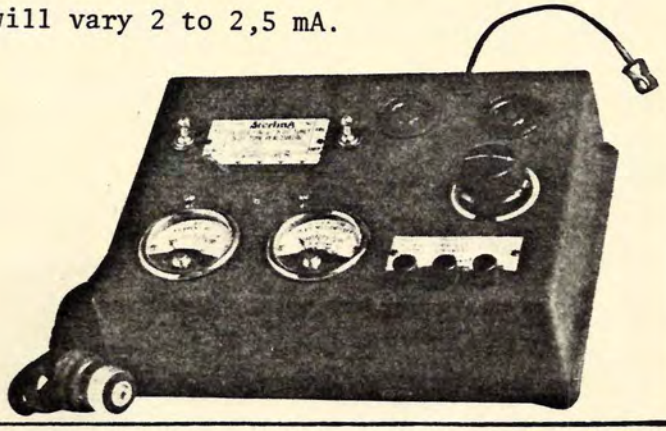
* * *

On Emission Meter 35 = 5 mA; 75 = 10 mA; 100 = 15 mA.

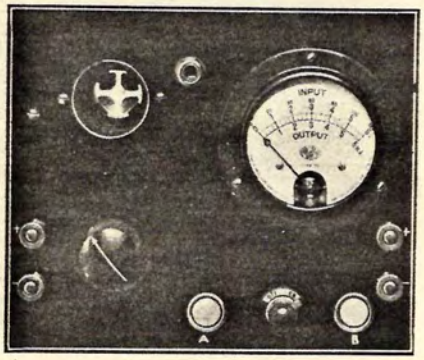
A good tube will vary from 4 to 6 mA.

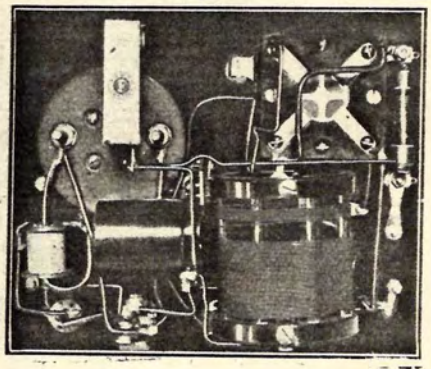
A poor tube will show a plate current of from 1 to 2 mA.

Tubes 99m 11m 12 will vary 2 to 2,5 mA.

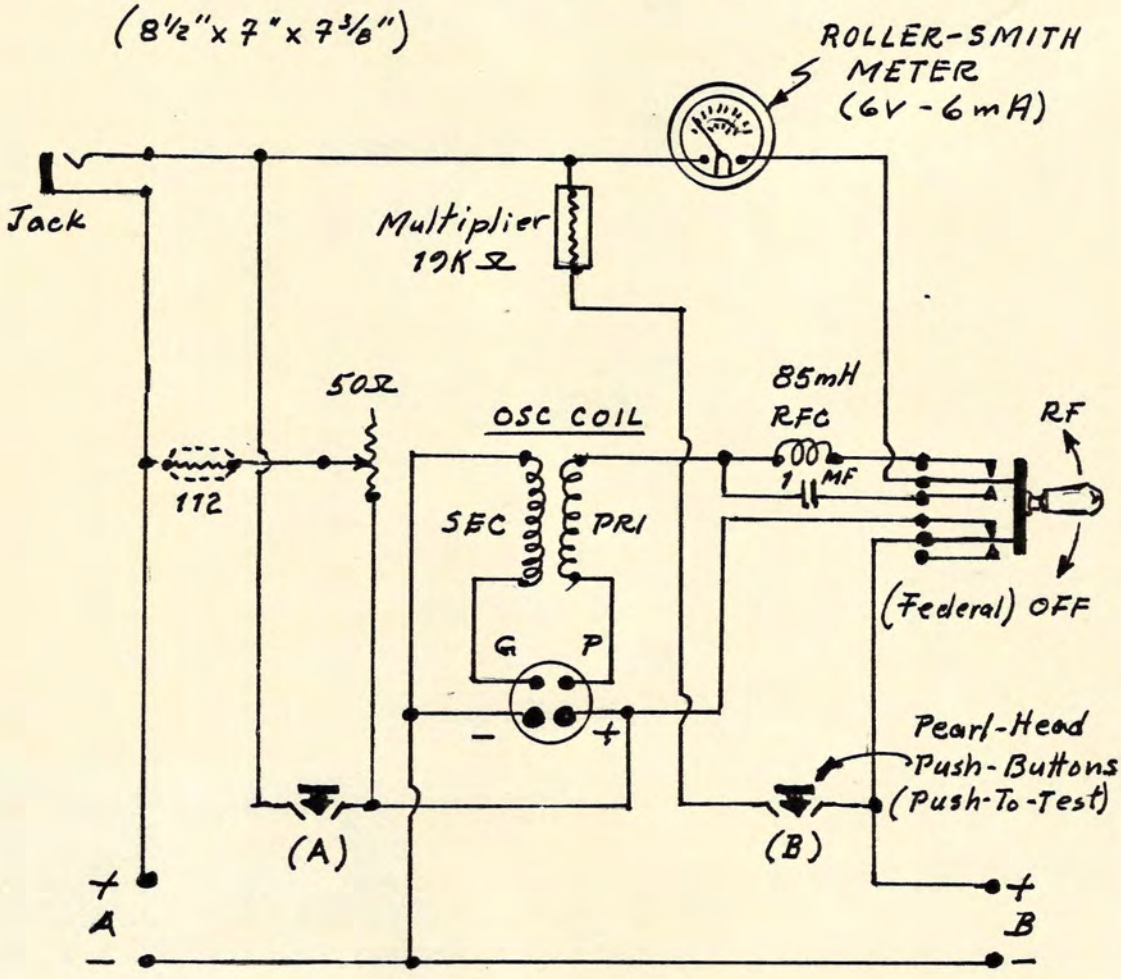


ADELMAN UNIVERSAL TESTER, 1927





(8½" x 7" x 7⅜")



(RW 12·17·27)

ADELMAN UNIVERSAL TESTER, 1927: Sht. 2

OPERATING PROCEDURE

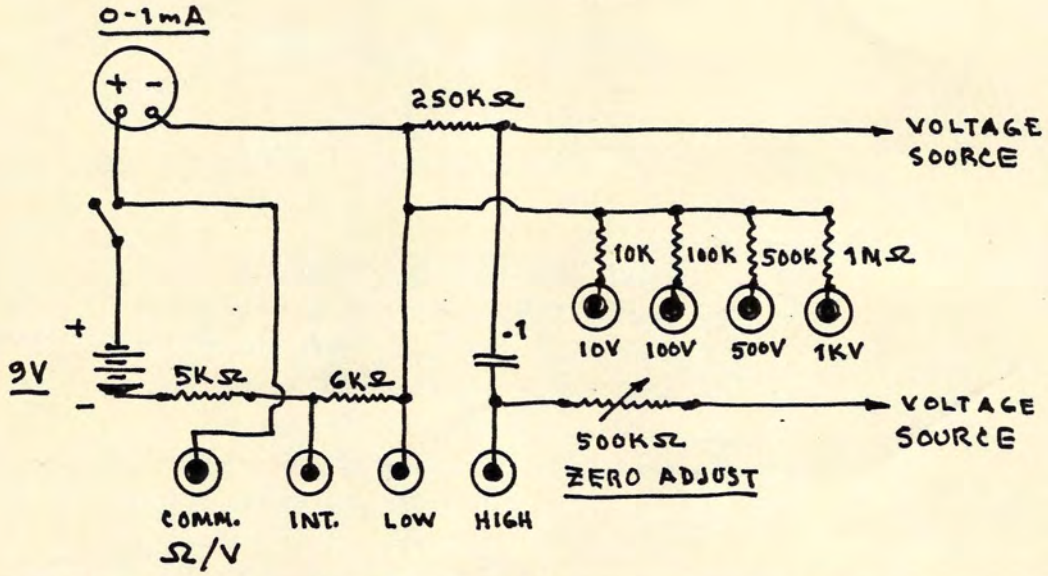
WARNING
"B" Votage Limit = 120V.

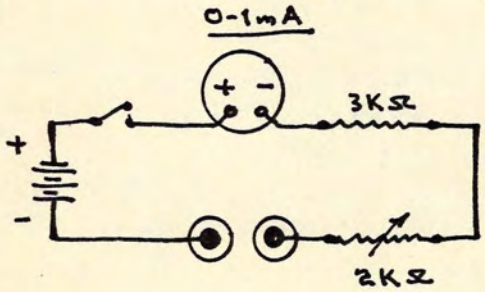
TUBE TEST:

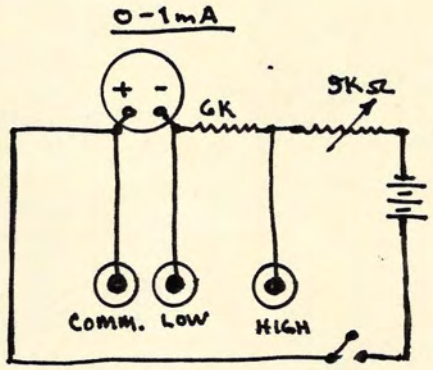
1. Connect "A" supply, 4V or 6V.
2. Be sure Rheostat is OFF.
3. Use 45V on the "B" of all tubes under test.
4. Place tube in socket.
5. Turn Rheostat up slowly.
6. Depress push-button "A".
7. Stop Rheostat when pointer reaches 3.3V or 5V, depending on tube.
8. Release "A" button; depress "B" button.
9. Place Federal switch to RF position (ON).
10. Note meter. Check reading against mA data for tube - e.g., 1.5/2.5mA for 99s.
11. If reading is low, discard tube.
12. When testing a 71, use 22½V for "B" input!

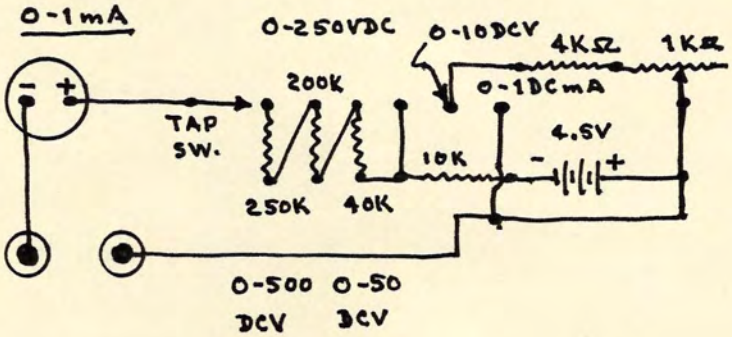
TYPE	POOR	GOOD	V.G.	VOLTS	AMPS
99	1.5mA	2mA	2.5mA	3.3	.06
01A	3.5mA	4	4.5	5	.25
00A	1.0mA	1.5	1.75	5	.25
12	5.0mA	5.75	6	5	.50
71	3.0mA	3.25	3.5	5	.50

EARLY OHMETER CIRCUITS

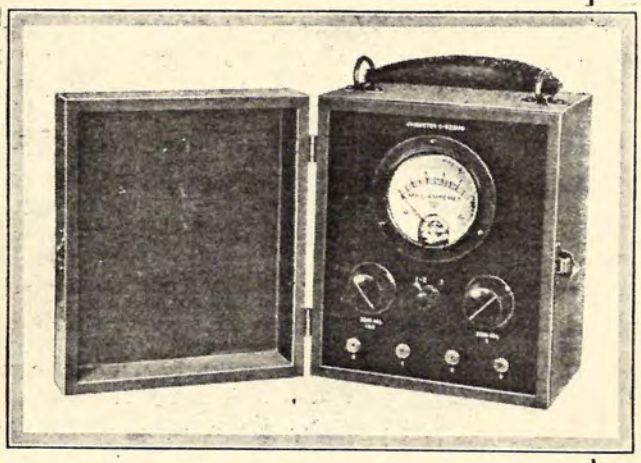




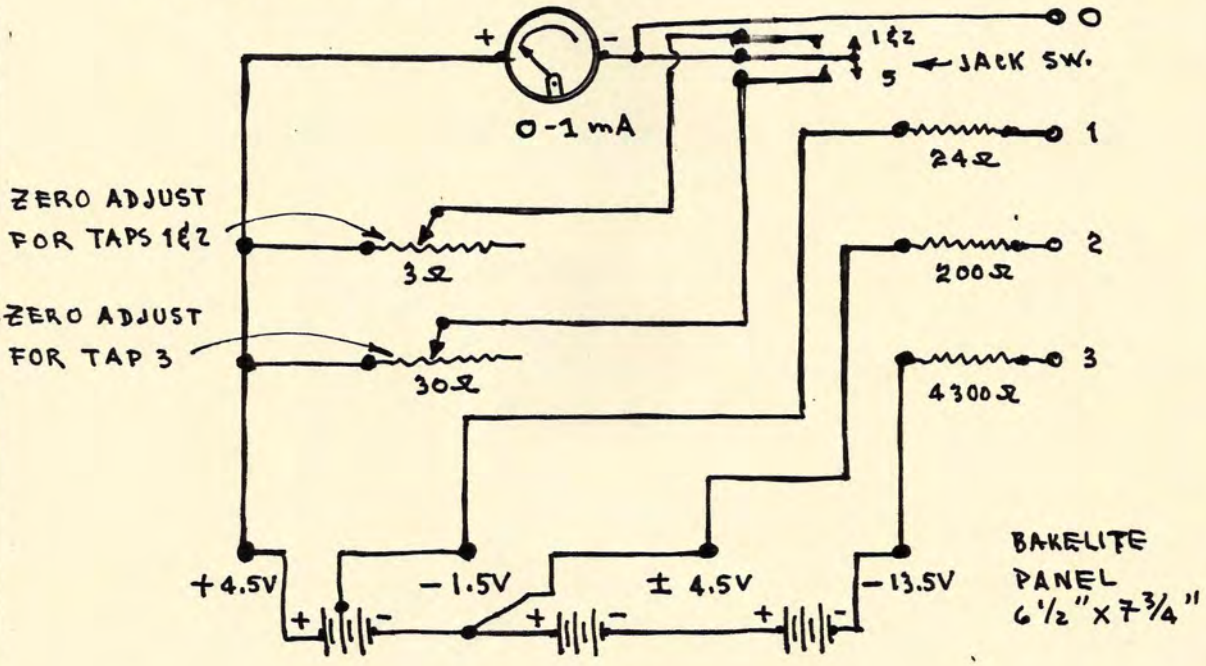




CB OHMETER, 1928



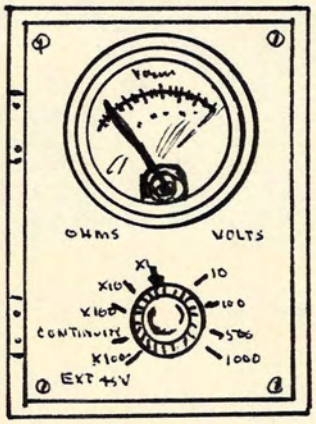
1. INSTRU. HAS 3 MEASUREMENTS.
2. SW. @ 1&2 POSITION; RESISTANCE TO BE MEASURED ACROSS 0&1; RANGE IS 20 TO 240Ω.
3. SW. @ 1&2, RESISTANCE ACROSS 0&2, RANGE = 80Ω TO 1040Ω.
4. FOR HIGHER RANGE, SW. @ 0&3; RANGE = 4KΩ TO 52KΩ.
5. METER MUST BE SET @ MAXIMUM READING (FULL DEFLEXION) BY L.H RHEOSTAT @ 1&2 SW. POSITION; R.H. FOR 3 POSITION.



6. FROM NOTE 5, RESISTANCE TO BE MEASURED WILL SHOW A CORRESPONDING DECREASE FROM MAX. READING.
7. EXACT VALUE TAKEN FROM GRAPH, q.v., INSIDE COVER. (THIS MUST BE DRAWN BY US.

(CB 9.28)

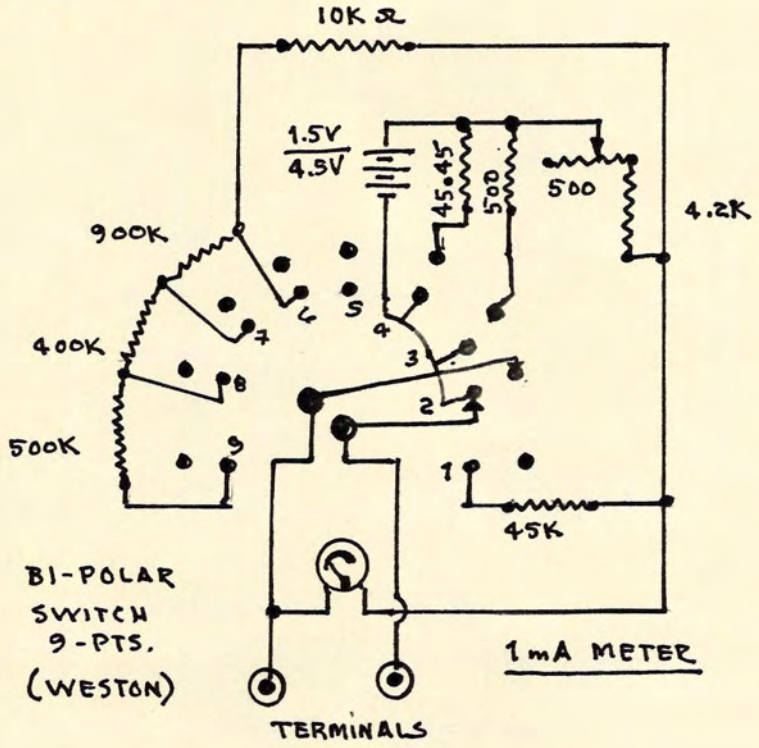
SHALLCROSS "QUICK-CHANGE" V-O Model 681

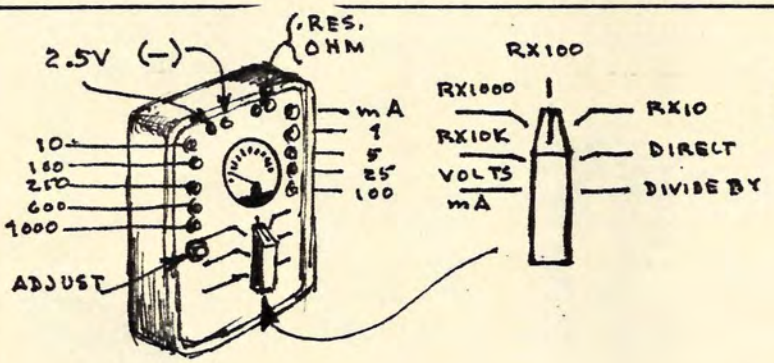


COVER REMOVED

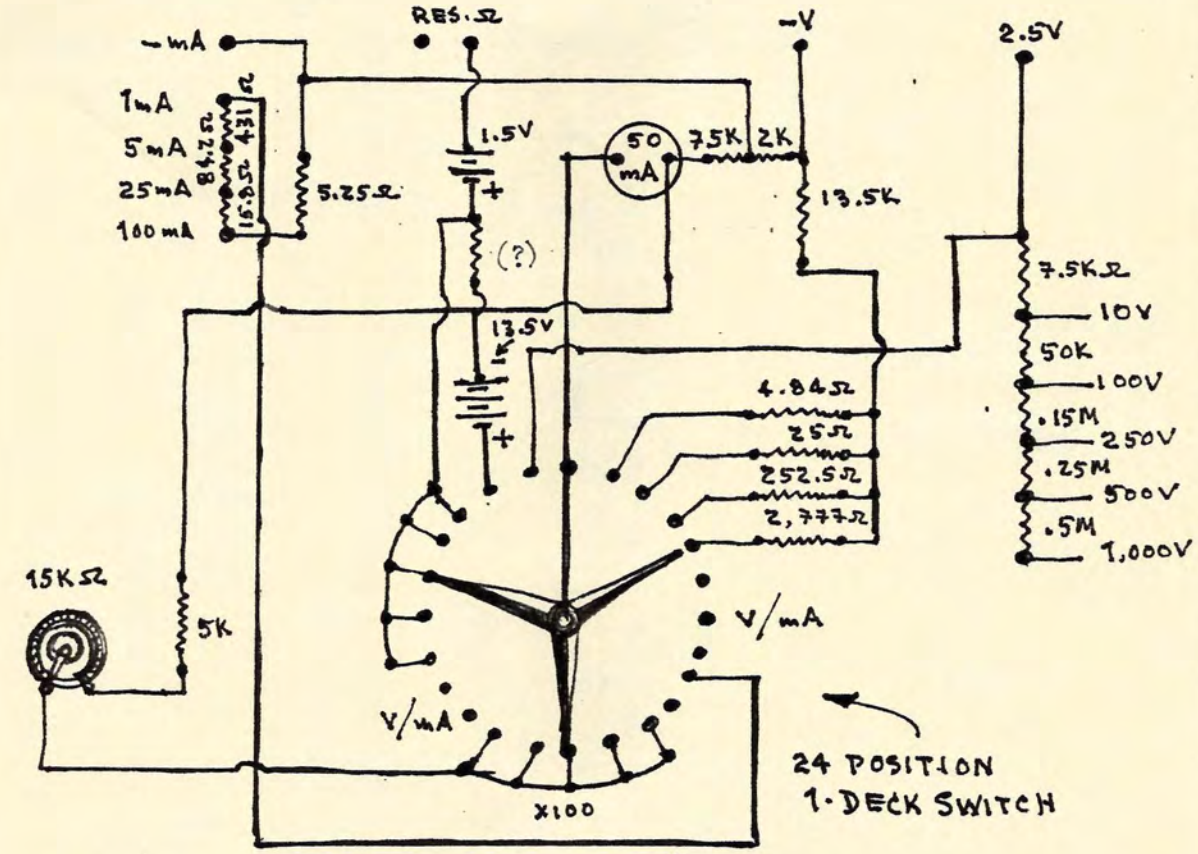
MAX. RANGE = 3,000,000 OHMS, WITH EXTERNAL 45V BATTERY, IN SERIES WITH METER.

DC VOLT RANGE = 0 ~ 1,000V.





WESTON MODEL 663 V-O METER, 1932



3-Finger Switch Reading, CW:

Top Centre =	no reading
÷ 5	÷ 5
X 1	X 1
X 10	X 10
X 100	X 100 (Bott. Centre)
X 1M	
X 10M	
V & mA	
(Skip)	

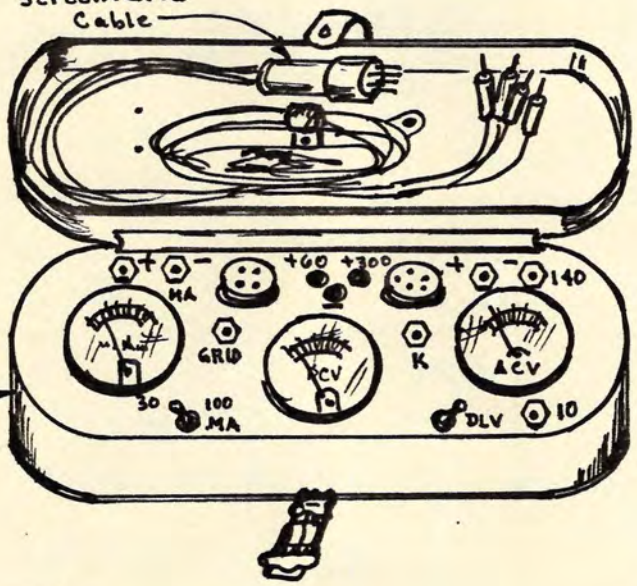
3-Finger Switch Reading, CCW:

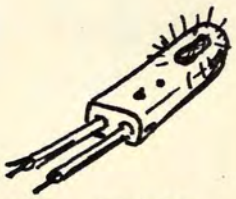
V & mA	V & mA
X 10M	X 10M
X 1M	X 1M
X 100	
X 10	
X 1	
÷ 5	
(Skip)	

WORKRITE J-245X JIFFY TESTER; 1929 - $15 (SH.1)

(3¼"H x 4"D x 8½"LG.)

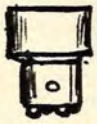
Model 245, Tube and Set Tester, with braid strap and leather handle.





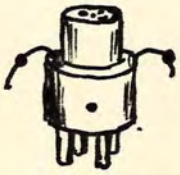
GLOW-PROBE (Neon)

J-11 MULTIPLIER
J-106 " w/ TIPS



J-19UV To UX

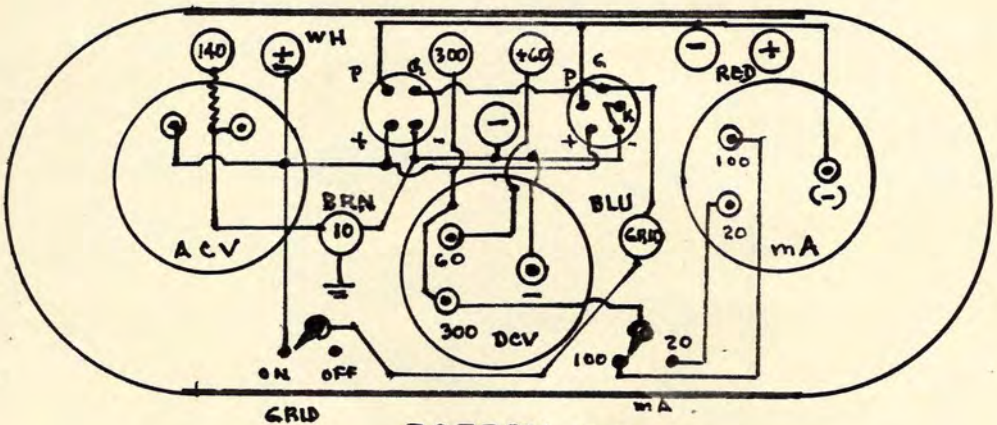
J-20 UX To UY99



J-24 KELLOG Arcturus Tubes

ADAPTERS

METERS: mA = 0-20/10-100
DCV = 0-300/0-60
ACV = 10/0-140



BOTTOM VIEW

(Sht.2)

OPERATING INSTRUCTIONS

WORKRITE MODEL J-245-X JIFFY TESTER

TO MEASURE FIL VOLTAGE, AC OR DC: Connect 4-lead cable terminals to tester, colour for colour. Place GRID switch at OFF. Plug tube into tester. Plug 4-lead cable into socket of removed tube. Read FIL voltage on 0-10 scale of AC voltmeter.

TO MEASURE PLATE CURRENT: Proceed as in Test 1. Set mA switch at 100. Read corresponding scale. If current is less than 20 mA, throw switch to 20, and read upper scale of mA meter.

TOTAL PLATE CURRENT OF RECEIVER: Use mA meter as a separate meter. Open b- lead to receiver. Set mA switch at 100. Connect opened B- leads to (-) and red jacks marked MILLIAMPS. If needle goes backward, reverse leads. Use red and black leads to make the connexion. If current is less than 20 mA, throw switch to 20.

PLATE VOLTAGE APPLIED TO ANY TUBE IN SET: Proceed as in Test 1. Read voltage on 0-300 scale.

TESTING TUBE CONDITION: Proceed as in Test 2. Note plate current. Throw GRID switch ON and again note plate current. Second reading should be considerably higher than the first - about twice.

MEASURING FIL EMISSION: Proceed as in Test 2. Leave GRID switch at OFF. With one lead, connect GRID and PLATE by plugging in (-mA) and Blue jack. Short out any plate resistor or AF xfrmr.

TO MEASURE AC LINE VOLTAGE: Tap the AC line at a convenient point, being careful not to affect a short. Bring one side of the line to jack marked 140; the other to jack marked White. Read line voltage on 0-140 AC volts scale.

CONTINUITY OR OPEN TESTS: Apply Tests 1,2,3,4. If these tests check-out properly, all circuits are okay. If no indications shows up on any test, something is open. To locate, use the DC voltmeter and an external 7½V battery. Plug black lead into (-) jack in centre of tester, and red lead into +60 jack. Connect red lead's other end to (+) side of external battery; black to (-). Use black lead for exploring the suspected circuit. If an open is found, no indication will occur on the meter.

SHORTS IN COMPONENTS TEST: Prodeec as in Test 8. Remove the part, if feasible, from the set. Connect the exploring leads to the part and note voltage reading. If component is good, there will be no reading for condensers; for resistors, full scale reading

WORKRITE MODEL J-245-X JIFFY TESTER OPERATING INSTRUCTIONS (Sht. 3)

should be obtained, and also an open coil.

TO DETERMINE GRID BIAS OF A TUBE: Use the DC voltmeter seperately. Plug red and black leads into (-) and +60 jacks. Connect other end of red lead to FIL or CATHODE (K) in the set, and the black end to the GRID or F- terminal of the coupling transformer ahead of the tube, or to the corresponding point on the grid-leak.

TEST FOR OVER-LOAD & DISTORTION: Proceed as for measuring plate current. If mA meter remains stationary or fluctuates only slightly, on loud signals, tube is not over-loaded. If it jumps around wildly tube is grossly over-loaded.

TO TEST FOR PROPER BIAS: Proceed as in Test 11, and note mA meter. If needle kicks upward on louf signals, bias is too high. If it kicks downward, bias is too low. If needle is stationary, bias is correct.

TO DETERMINE THE START & STOP OF OSCILLATION: Proceed as for obtaining plate current, plugging into oscillator tube. Start of oscillation is indicated by a sudden rise in plate current. Stopping of oscillation is indicated by a sudden drop in current.

TESTING SCREEN-GRID TUBES: Proceed as for other tubes, leaving the GRID switch at the OFF position. Connect one end of the Screen-Grid leads supplied with the unit to the control grid-cap, and the other end to the normal cap for the tube. Read plate current on mA meter. Control grid test may be made by removing the end of the lead at the set and touching it to the jack marked 10 (Brown). Plate current should increase.

MEASURING DC VOLTAGES: Use DC voltmeter seperately and connect one J-106 multiplier in series with one of the leads to the meter. Read the 0-300 scale, and multiply by 2. Measurements up to 600V may be made.

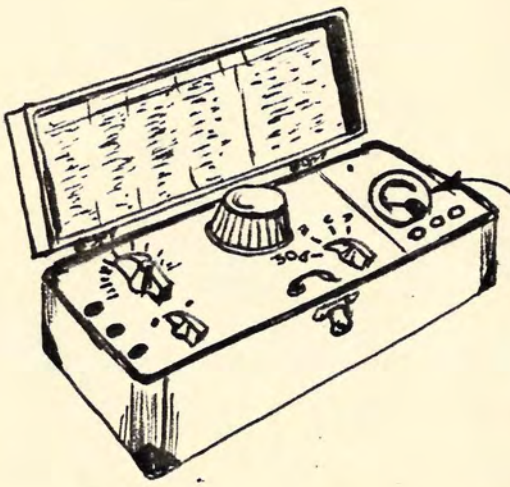
TO MEASURE UV99 TUBES: Use adapters J-19 or J-20, as required, and proceed as for other tubes.

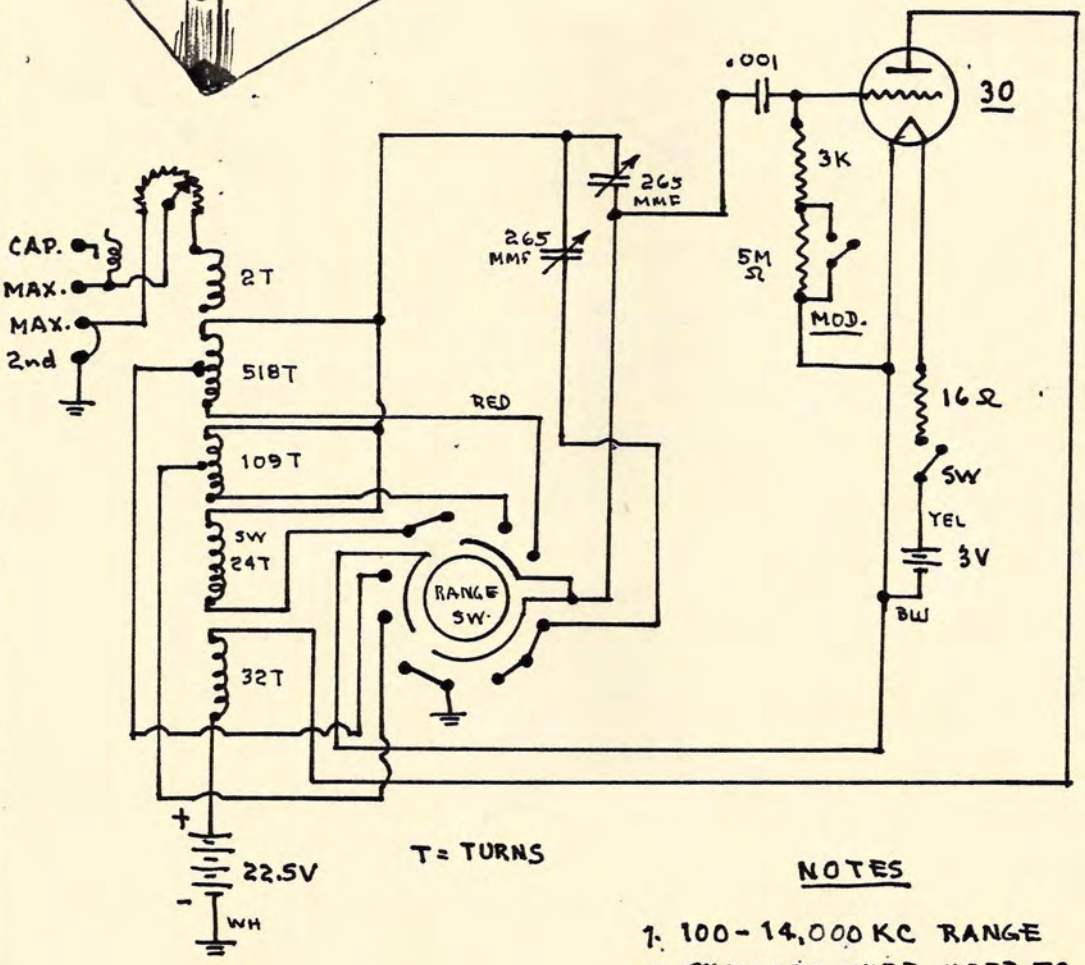
TO MEASURE KELLOGG OR OLDER ARCTURUS TUBES: Use adapter J-24 and connect red leads to heater clips. Proceed as with other tubes.

MEASURING SCREEN-GRID VOLTAGE: Use DC voltmeter seperately. Plug red lead into +300 jack; black lead into (-) jack. Connect other end of red lead to screen-grid (G on socket), and black lead to FIL or cathode. Read voltage. If less than 60, move red lead on tester to +60 jack and read lower scale.

* * *

READRITE TEST OSCILLATOR
Model 553 • Batt. Operated
(Also 554 & 556)



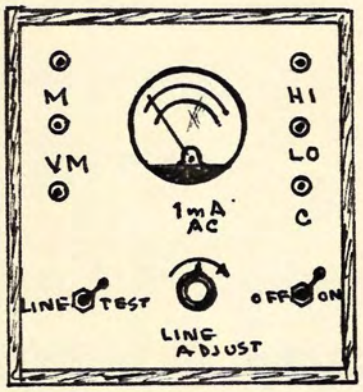


T = TURNS

NOTES

1. 100 - 14,000 KC RANGE
2. SHIELDED WIRE USED TO LEAD SIGNAL TO RECEIVER.
3. CAP. & 2nd USED FOR WEAK SIGNALS; MAX & MAX FOR LARGE OUTPUTS.

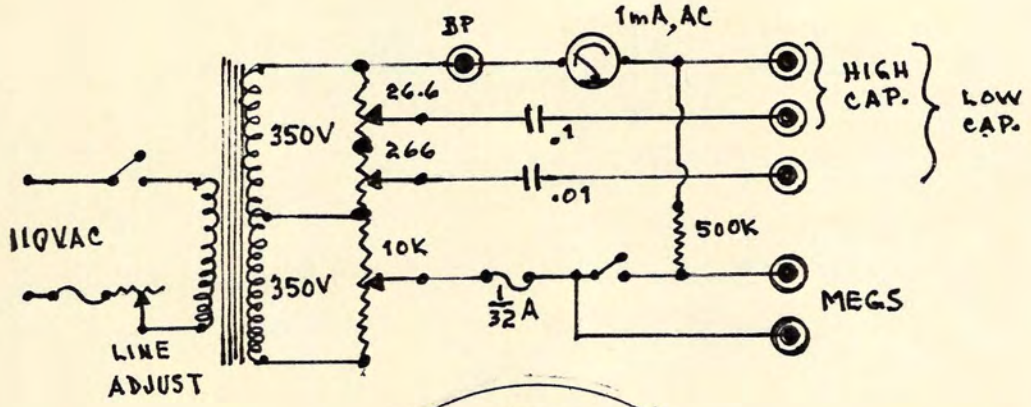
RESISTANCE-CAPACITY METER, 1934
(E.M.Shiepe)

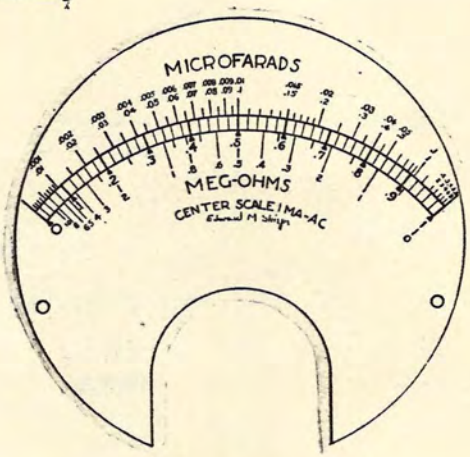


5" x 5" PANEL (BAKELITE)

RANGES
.0001 MFD ~ 10 MFD
50K OHMS ~ 10 MEGOHMS

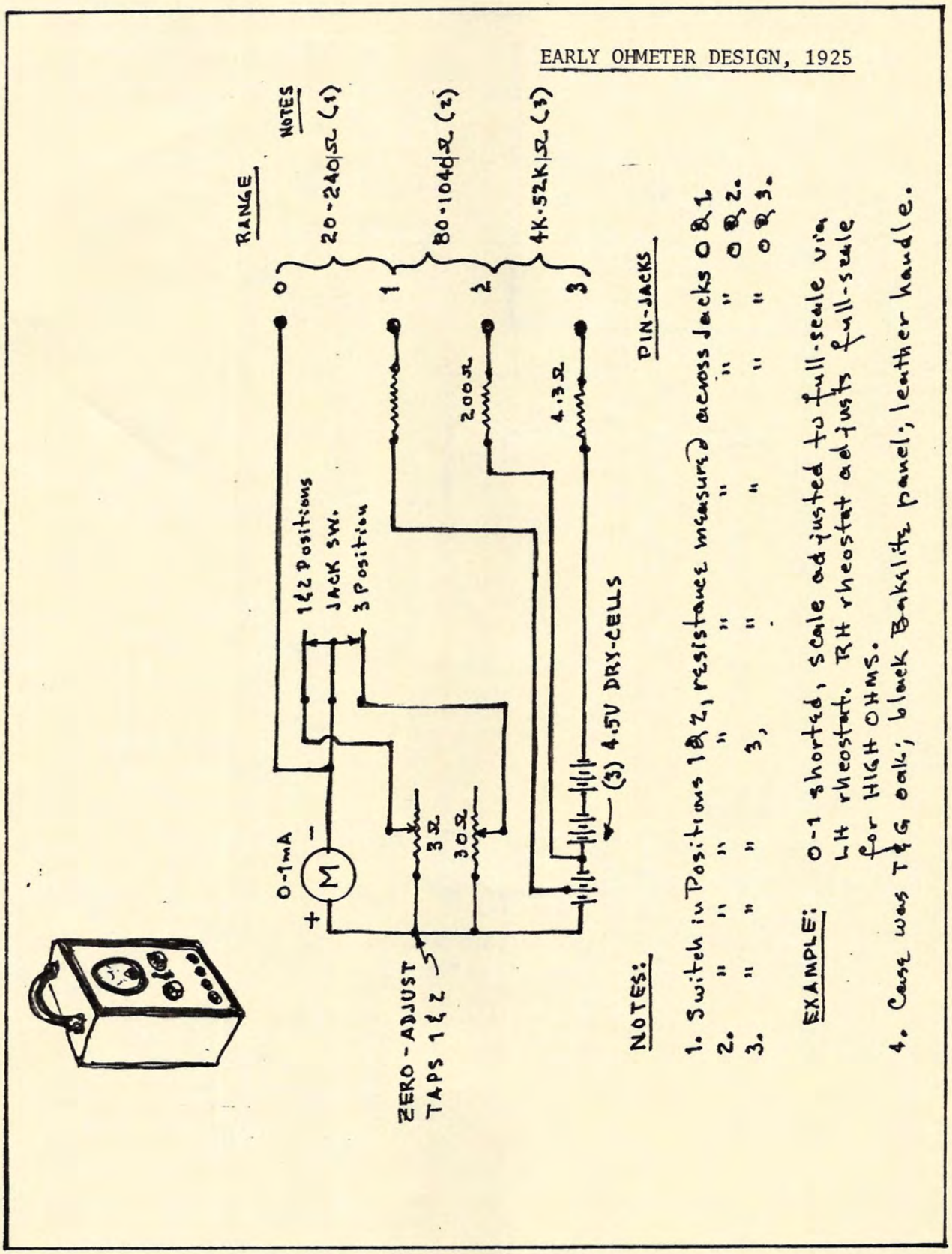
PLYWOOD ENCLOSURE 4¼" x 5½" x ⅜"
(D) (SQ.)





FULL-SCALE

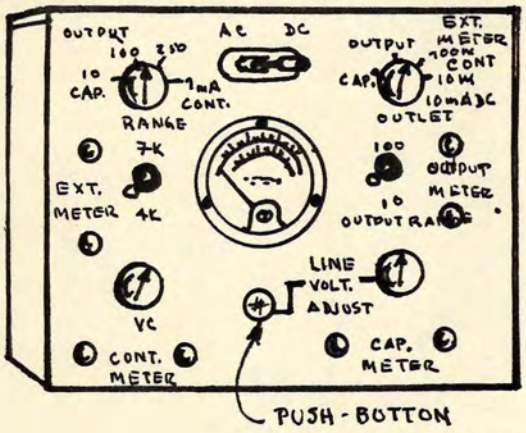
(RW 7.28.34)

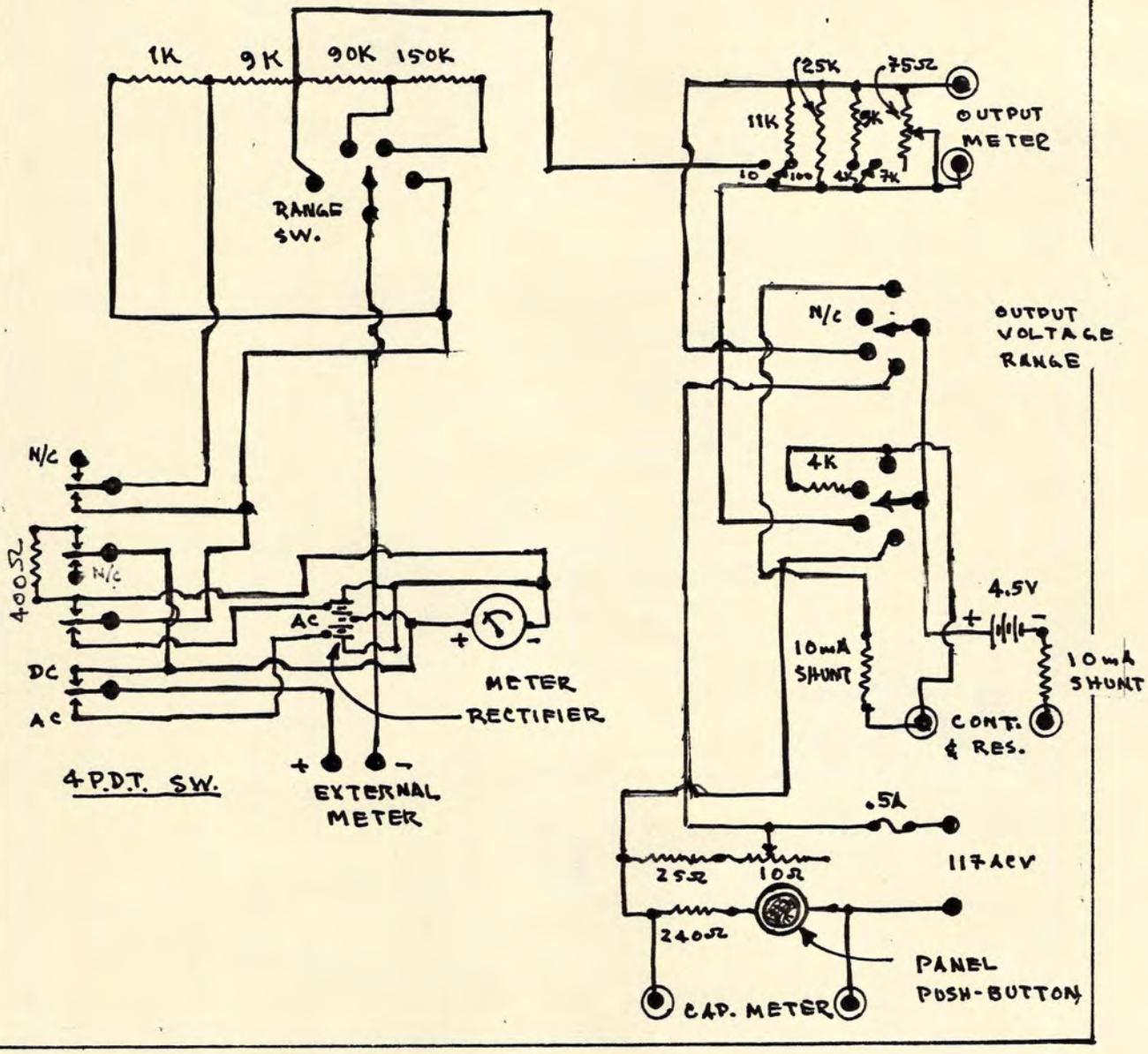

EARLY OHMETER DESIGN, 1925
RANGE
NOTES
0
1
2
3
20-240Ω (1)
80-1040Ω (2)
4K-52KΩ (3)
1&2 Positions
JACK SW.
3 Position
200Ω
4.3Ω
0-1mA
M
3Ω
30Ω
(3) 4.5V DRY-CELLS
PIN-JACKS
ZERO-ADJUST
TAPS 1&2
NOTES:
1. Switch in Positions 1&2, resistance measured across jacks 0&1.
2. " " " " " " 0&2.
3. " " " 3, " " 0&3.
EXAMPLE: 0-1 shorted, scale adjusted to full-scale via LH rheostat. TRH rheostat adjusts full-scale for HIGH OHMS.
4. Case was T&G oak; black Bakelite panel; leather handle.

HOME-BREW MULTIMETER, 1931

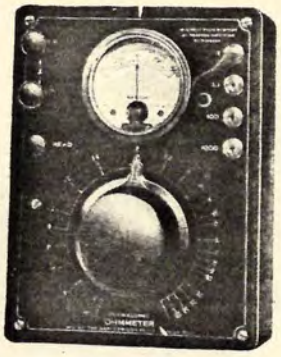
Measures Resistance, Capacitance, Output Voltages, Current, Voltage AC & DC.
(Inaccurate at RF frequencies!)
0-1 mA Triple scale meter, 1K per V.

Capacity Range = 10 to 0.1 MFD.
Voltage Range = 0 to 250V.
Current = 0-1 mA.
Resistance = 0 to 100,000 ohms.



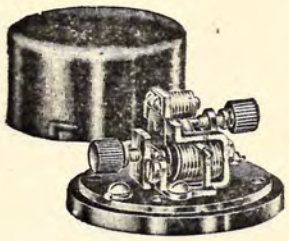


REPRESENTATIVE TEST EQUIPMENT

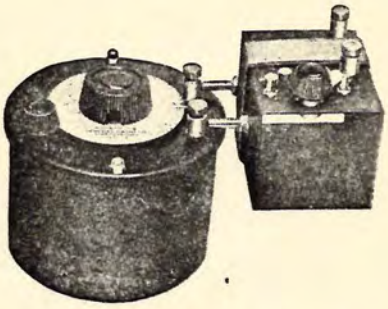


FLEWELLING
OHMETER
(1926)

JEWELL
135A, -B, -C
METERS
(1924)



MESCO RADIO BUZZER
(1919 - $2.05



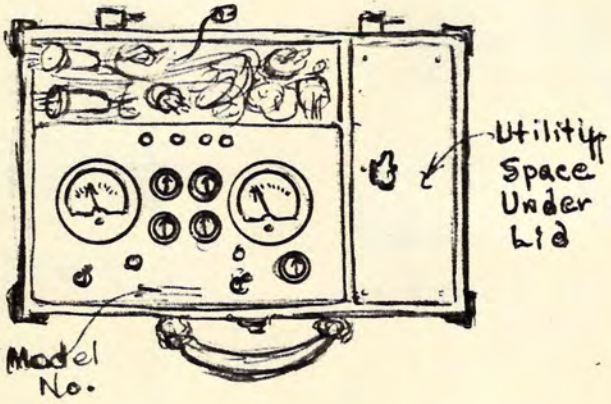
GENERAL RADIO
Type 247W
(1923 - $11)

WESTON
SET TESTER
Model 519
(1927 - $48)

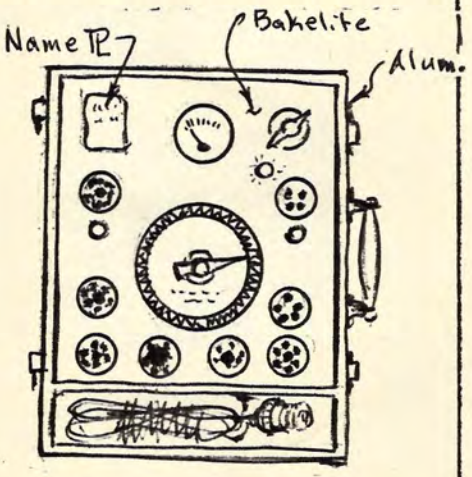
JEWELL
Type 199
SET TESTER
(1926 - $39)

GENERAL RADIO
TEST OSC.
Type 320
(1929)

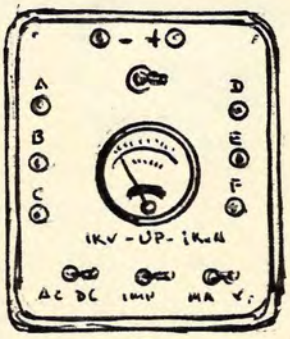
IDENTIFICATION SKETCHES OF
COMMERCIAL TEST EQUIPMENT, Sht. 1



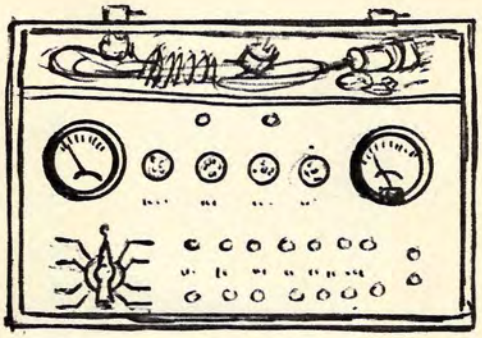
READRITE MODEL #1000



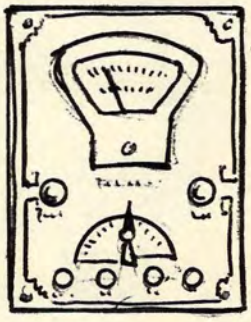
READRITE "UNAMETER"



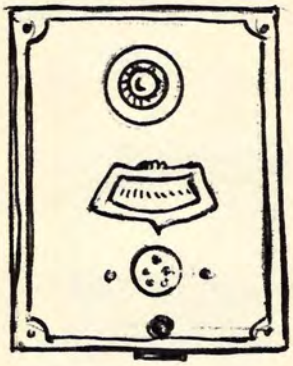
SHALLCROSS GENERAL
PURPOSE METER



READRITE MODEL # 720

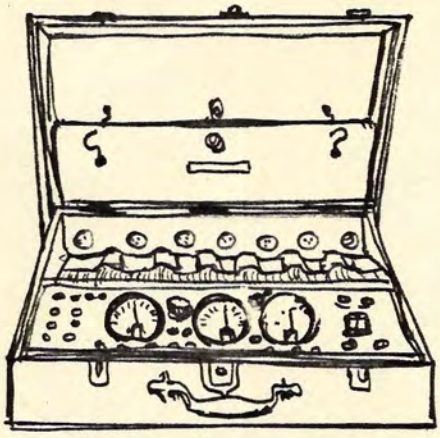


RADIO CITY VTVM
MODEL 409

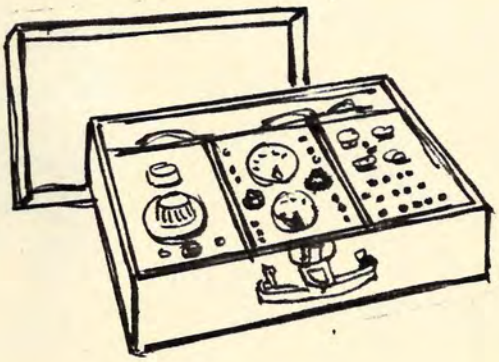


TEST OSCILLATOR
Direct Rado Sales

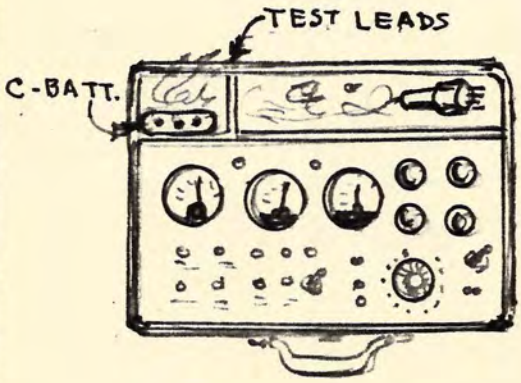
VINTAGE TEST EQUIPMENT IDENTIFICATION SKETCHES: Sht. 2



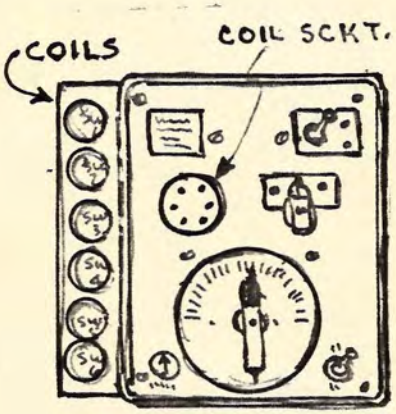
SUPREME 400-A SET ANALYZER



SUPREME 400-C SET ANALYZER

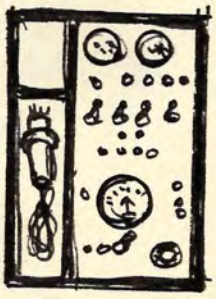


READRITE TUBE TESTER 711

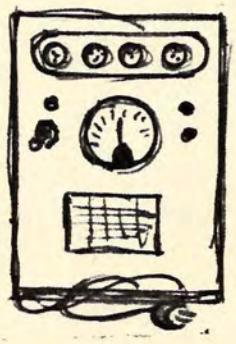


WESTON ALL-WAVE OSCILLATOR 692

JEWELL TUBE TESTER
#210



MADSEN ANALYZER



VAN HORN "D"
TUBE TESTER

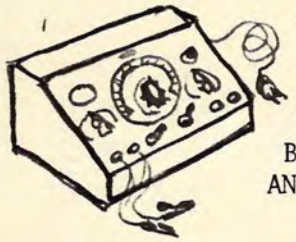
COMMERCIAL TEST EQUIPMENT IDENTIFICATION SKETCHES, Sht. 3

SUPREME 89D

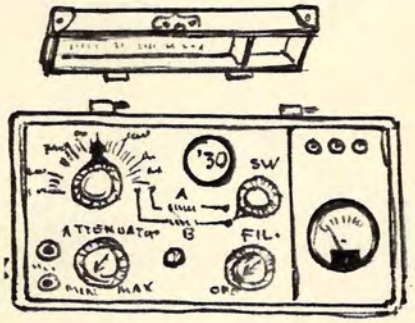
TUBE TESTER

FLEWELLING
TUBE TESTER

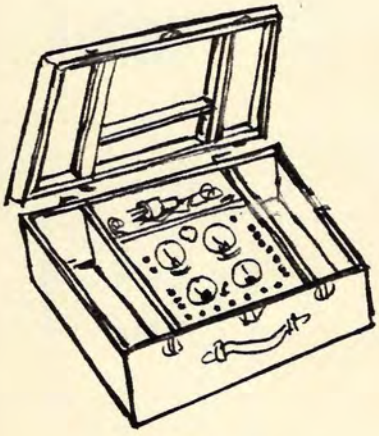
RADIO CITY 305C
SET ANALYZER



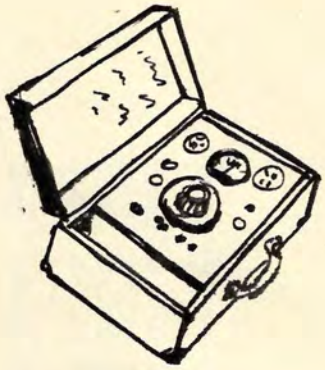
TOBE
BRIDGE
ANALYZER



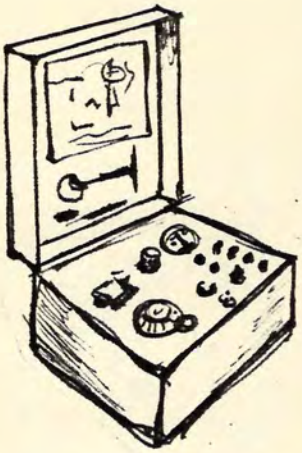
READRITE 550 TEST OSCILLATOR



JEWELL SET TESTER
(409)

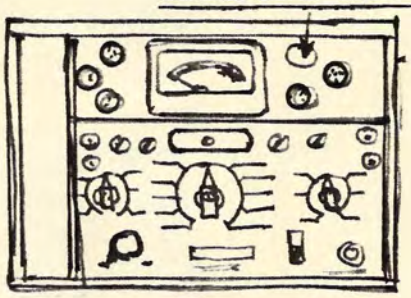


CONFIDENCE TUBE TESTER

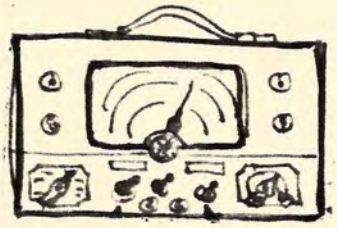


GENERAL RADIO
360 TEST OSCILLATOR

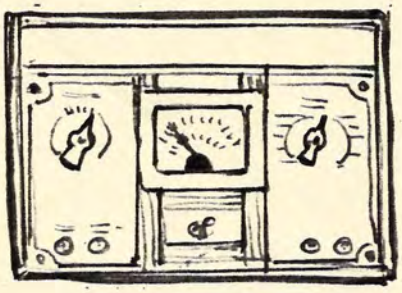
COMMERCIAL TEST EQUIPMENT IDENTIFICATION SKETCHES, Sht. 4



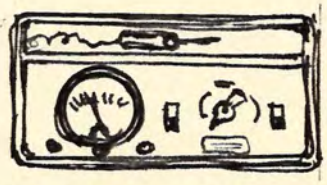
dayrad 20 SET ANALYZER



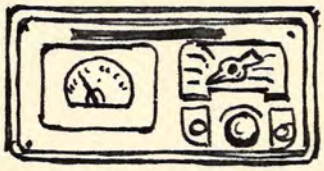
SUPERIOR T-37 SIGNAL GENERATOR



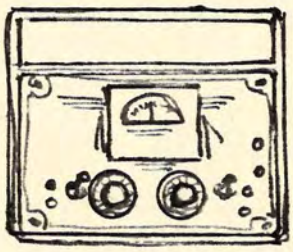
SIMPSON 250 SET TESTER



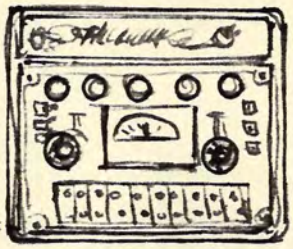
SUPERIOR CA-11 SIGNAL TRACER



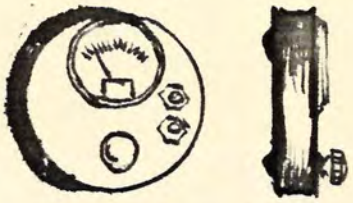
PRECISION MULTIMETER 830



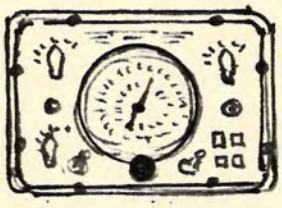
SUPREME 541
SET TESTER



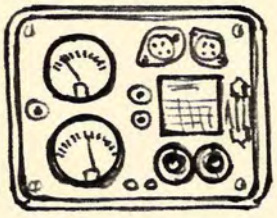
SUPREME 551
ANALYZER



READRITE OHMETER

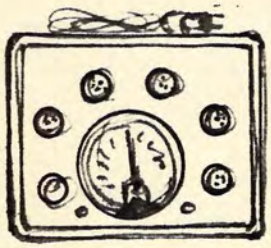


SUPREME 570
SIGNAL GENERATOR

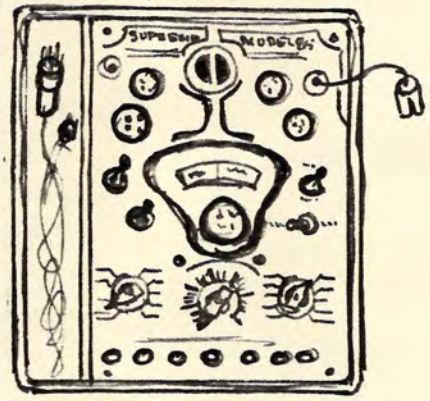


WESTON 533 TUBE TESTER

COMMERCIAL TEST EQUIPMENT IDENTIFICATION SKETCHES, Sht. **5**

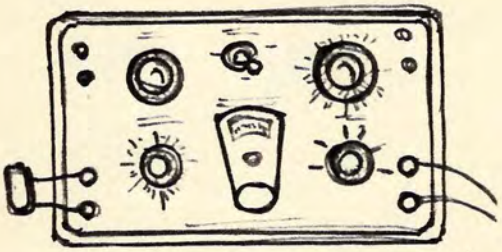


SUPREME 17
TUBE TESTER

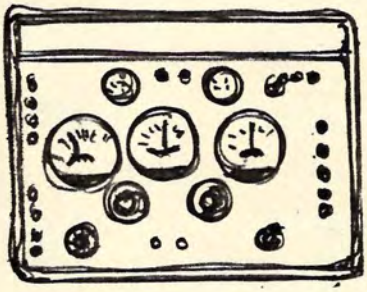


SUPREME 85 TUBE TESTER

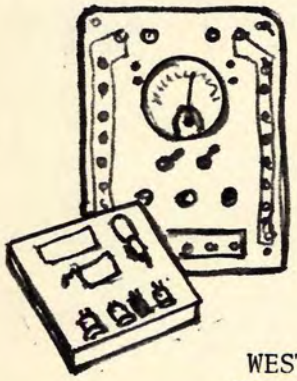
READRITE 245/245-A
TUBE TESTER



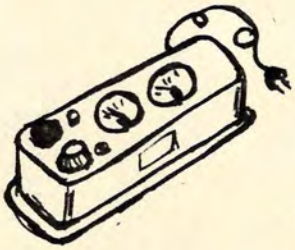
SHALLCROSS WHEATSTONE BRIDGE
#630



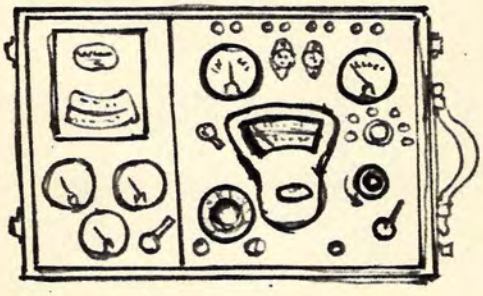
WESTON 547 SET TESTER



WESTON 667
SET ANALYZER



JEWELL 150
TUBE
TESTER



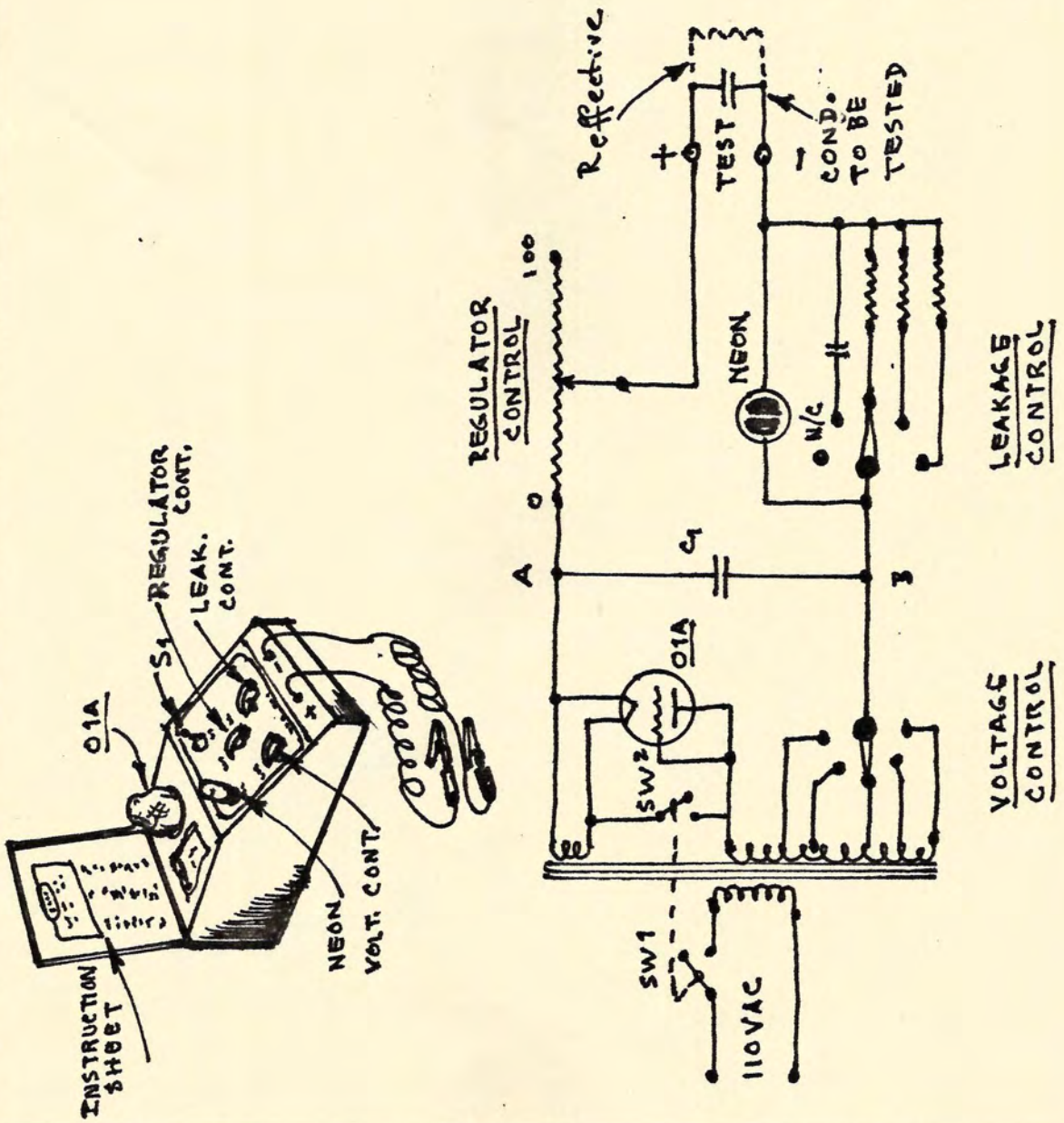
WESTON 526

TOBE CONDENSER ANALYZER, 1929
Sht. 1 of 2

(Relaxation Oscillator)

Unit tests CONDITION of capacitors, not capacity.

Switches S1 & S2 are ganged in opposition: when S2 is opened, S1 is closed.



TOBE CONDENSER ANALYZER, 1929
Sht. 2 of 2

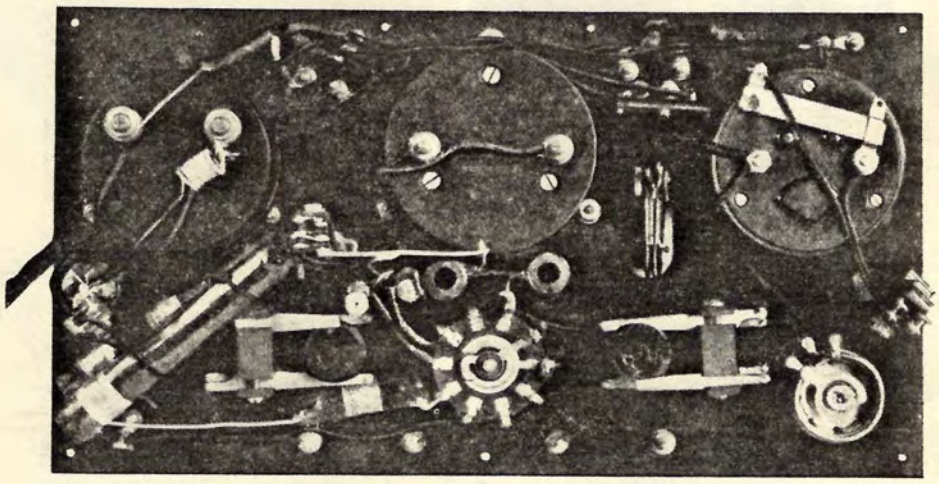
GENERAL NOTES

1. Output voltage across A-B = 700 VDC.
2. For solid dialectrics, set all controls for MAX, and Leakage Control @ 2.
3. A good condenser will momentarily chargeC1, and illuminate neon lamp.
4. When condenser under test is fully chanrged, neon will extinguish.
5. If condenser under test has a small leakage, a small current will continue to flow and recharge C1, flashing the neon lamp.
6. Flashes may be up to 10 minutes apart!!!
7. The more quickly C1 charges, the poorer the condenser under test.
8. A poor condenser will cause neon lamp to flash several times per second.
9. For values from 0.05 - 50 MFD, set Leakage Control @ 1. If condenser is shorted, neon lamp will glow.
10. An open circuit is indicated by an absence of any flashing from the neon lamp.
11. For electrolytics, set Leakage Control @ 2-3-4-5. Set the controls for the rated voltage of the condenser under test.

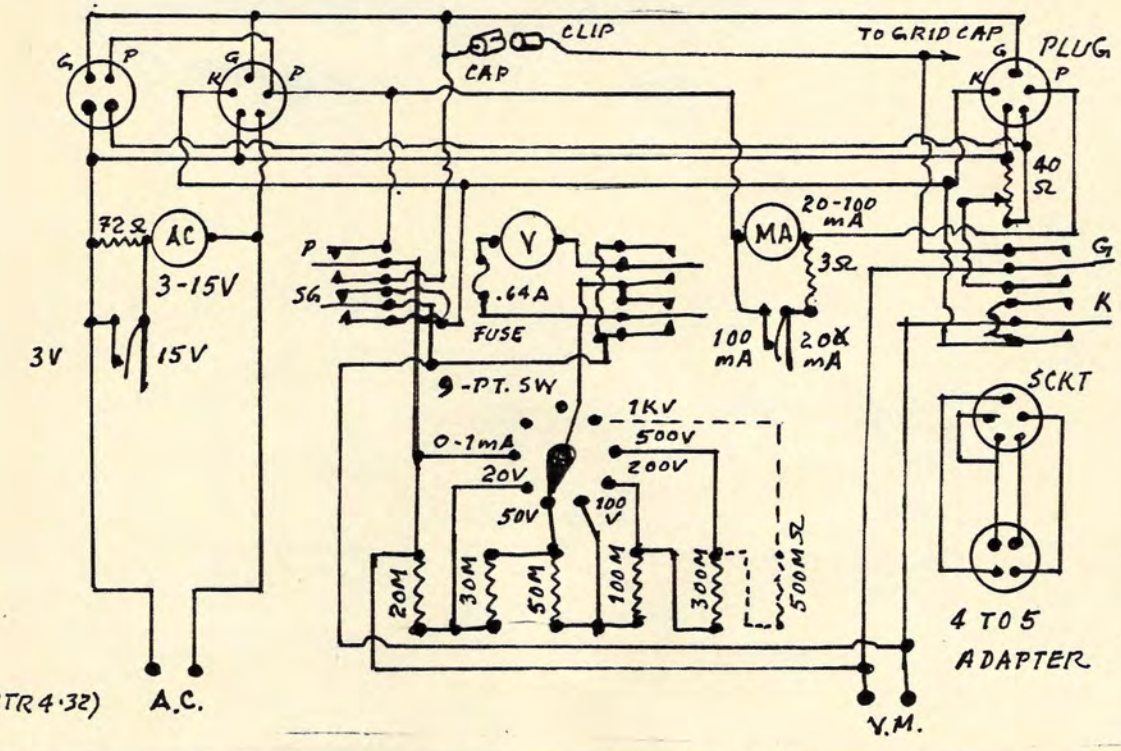
A COMPLETE & COMPACT SET ANALYZER; Sht.1

Of all the early test equipment that I have constructed I easily admit that this little jobbie is a favourite. It is handy for most any test you wish to carry out on vintage radios, excluding only rectifier tubes. The meters shown were, left to right, Weston Type 476, Jewell Pattern 54,and Weston Type 301. Their function may be gotten from their place on the schematic over-leaf. All resistors are wire-wound, with a tolerance of 1 o/o. If you have a go at constructing this unit, and have any questions, I will be quite happy to tell you what I know, as with every other item contained in these Sketch-Books, which is what the hobby is all about, anyway.

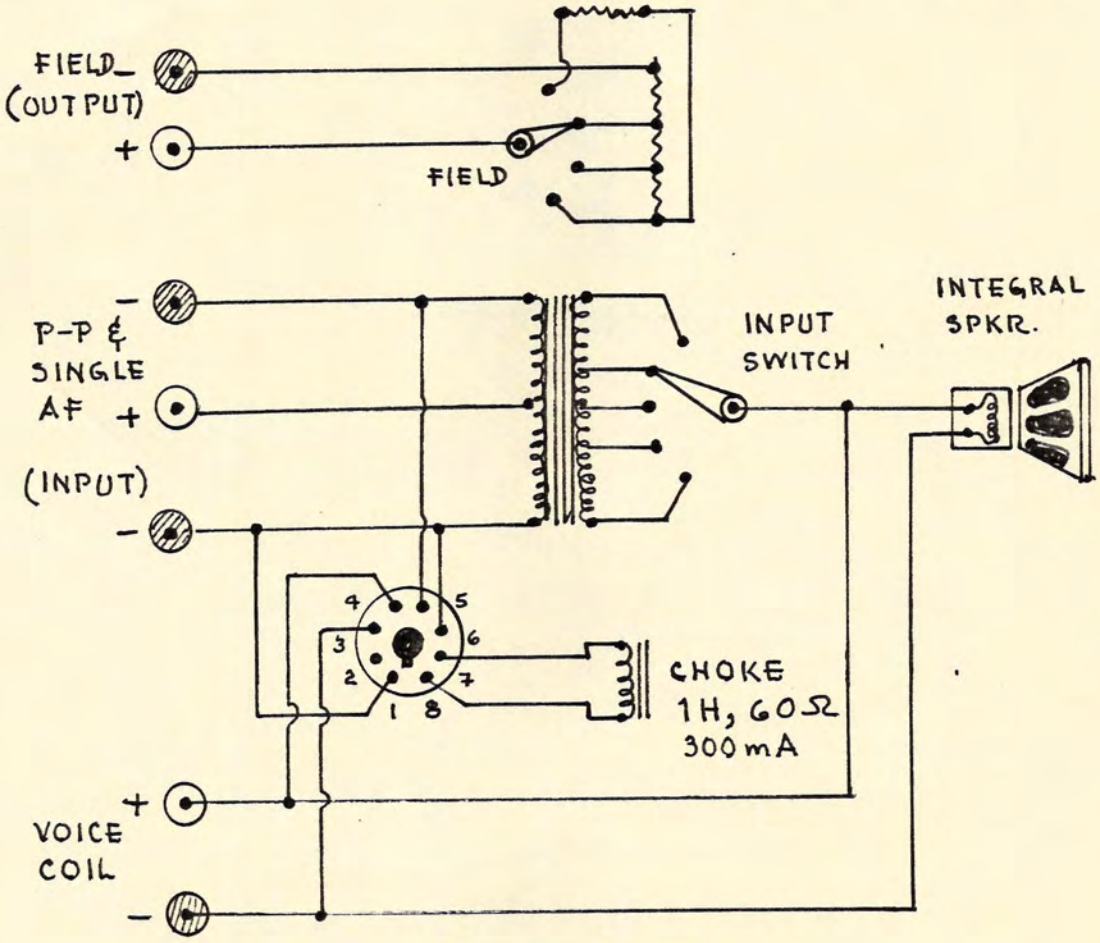
A COMPLETE & COMPACT SET ANALYZER; Sht. 2



REAR VIEW of PANEL



"FERRET" TEST SPEAKER DATA, #620
Coastwise Electronics, L.A.



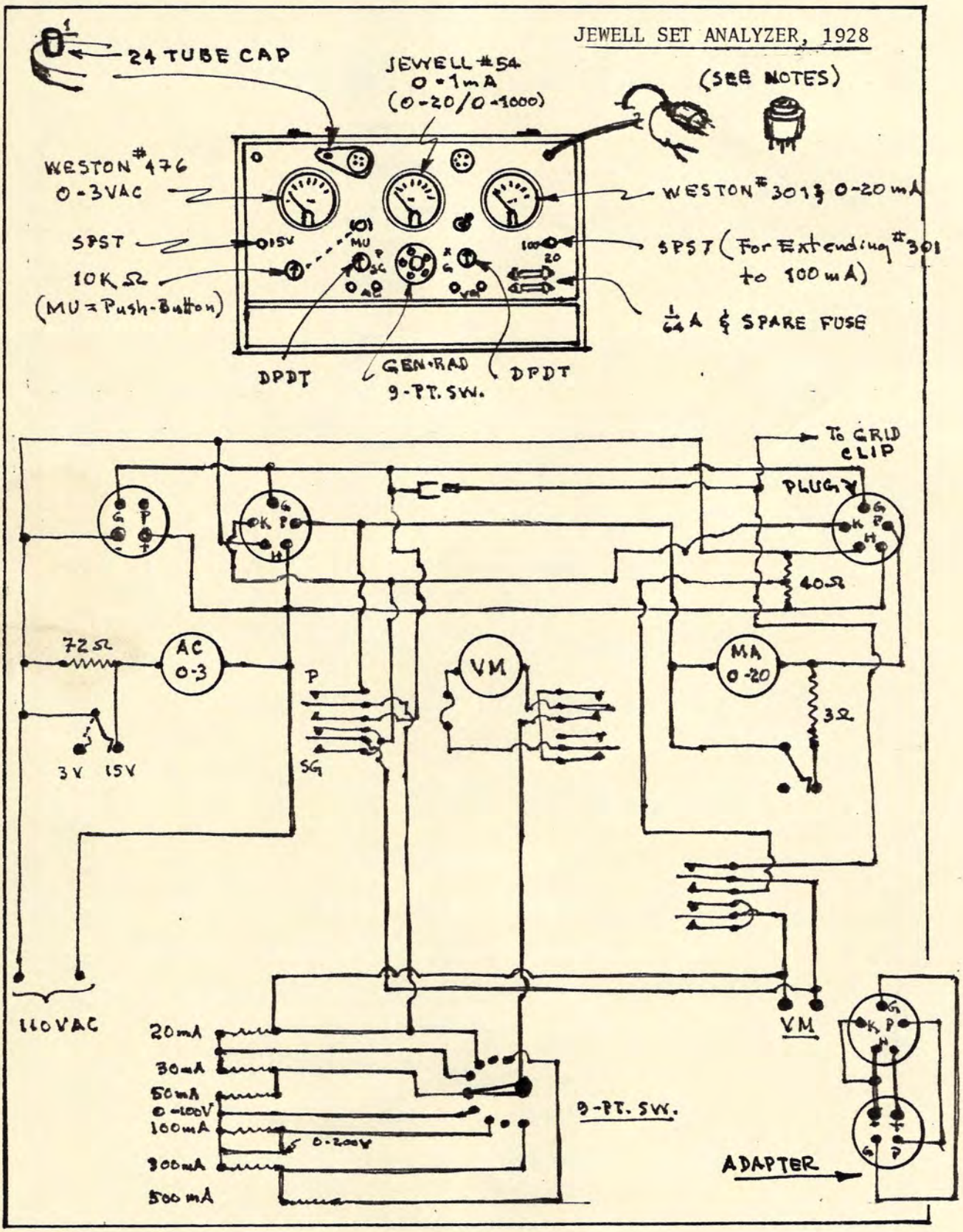
GENERAL NOTES

1. Field coil range = 500-ohms - 2,500-ohms; 150-175 mA.
2. Input jack arranged for P-P or ingle tube.
3. Output tubes & combinations tabulated on front panel as follows:

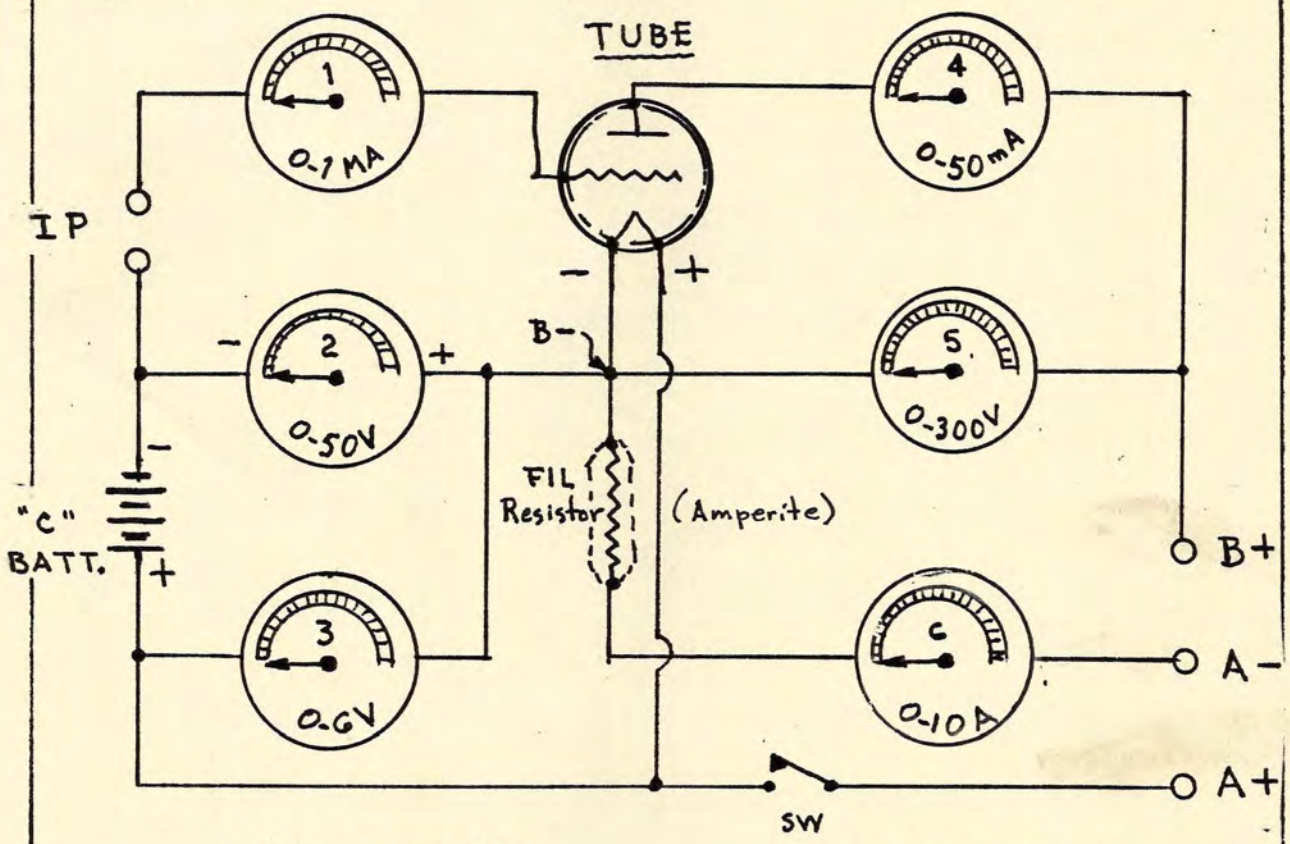
   42, 45, 47, 50, 71, 2A3, 3S4, 3Q4, 6A3, 6AK6,

   6B4, 6AC5, 6AQ5, 6E6, 6K6, 6V6, 6L6, 6F6, 25L5,

   35L6, 50L6, 50B5, 1A5, 1N6, 1E7, 1F5, 7C5.


JEWELL SET ANALYZER, 1928
24 TUBE CAP
JEWELL #54
0-1mA
(0-20/0-1000)
(SEE NOTES)
WESTON #476
0-3VAC
WESTON #301 & 0-20mA
SPST
10KΩ
(MU = Push-Button)
SPST (For Extending #301 to 100mA)
1/64A & SPARE FUSE
DPDT
GEN-RAD
9-PT. SW.
DPDT
To GRID CLIP
PLUG
40Ω
72Ω
AC 0-3
3V 15V
VM
MA 0-20
3Ω
SG
110VAC
20mA
30mA
50mA
0-100V
100mA
0-200V
300mA
500mA
9-PT. SW.
VM
ADAPTER

JEWELL TUBE & CIRCUIT TESTER #95
(Sht. 1)



1. Grid Current Meter
2. Grid Bias Meter
3. Filament Voltage Meter
4. Plate Current Meter
5. Plate Voltage Meter
6. Filament Ammeter

IP = Input for grid exciters (resistor or xfrmr. SEC). e.g.: shorts tested by inserting ends at IP & measuring grid bias below & above the Input Device.

I. Continuity of Plate circuit is indicated by deflexion on Meter 4. If there is deflexion, voltage exists on the plate, filament voltage is correct, and plate current is flowing.

II. Plate current will change if grid voltage is varied; this proves grid circuit is continuous. An increase in grid bias results in a drop in plate current.

III. Meter 6 will measure total current in a multi-tube set, or a single 99 tube.

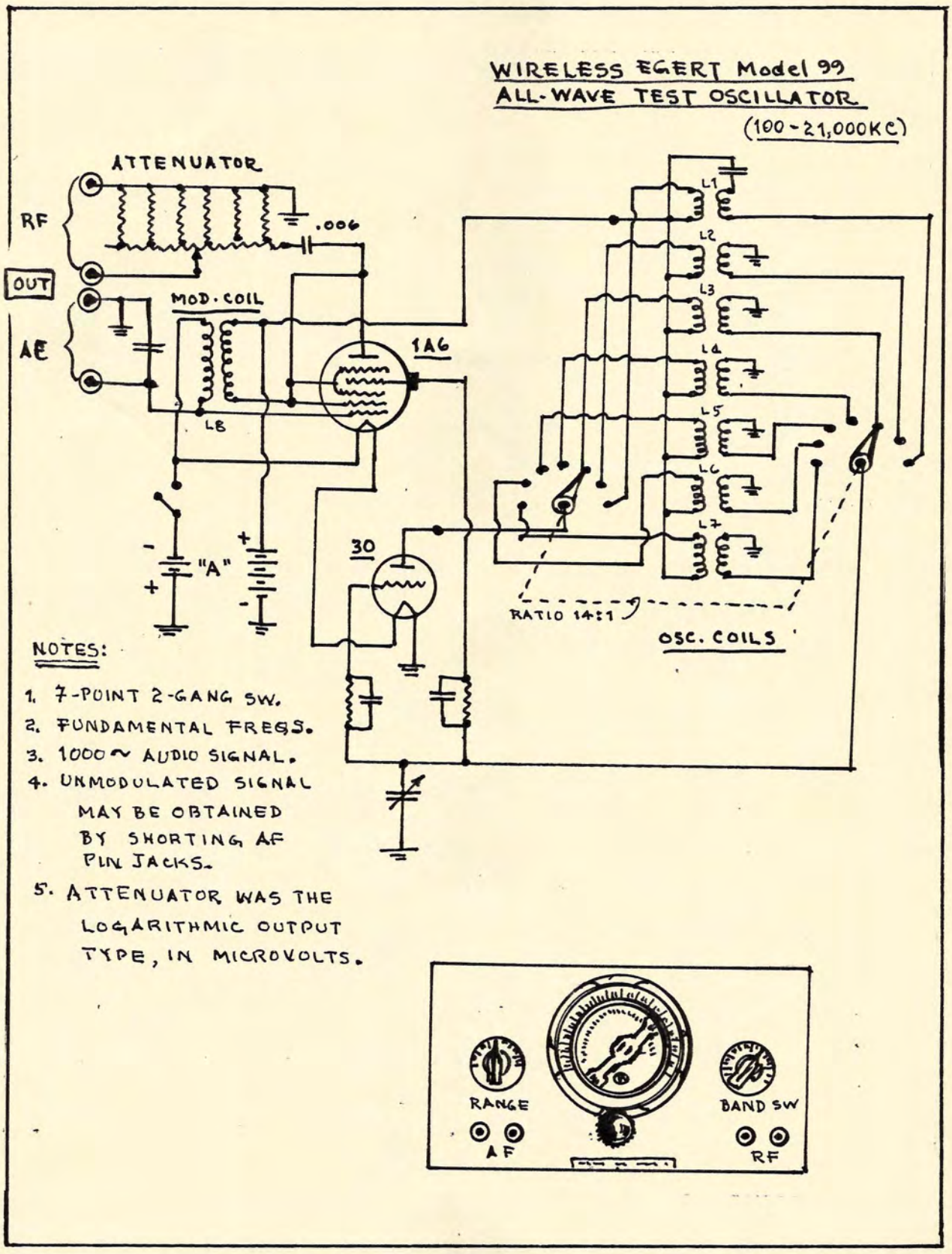
JEWELL TUBE & CIRCUIT TESTER #95
(Sht. 2)

IV. To test PRI of xfrmr. for short, short-circuit PRI and note deflexion on Meter 4. If circuit is correct, plate current will increase.

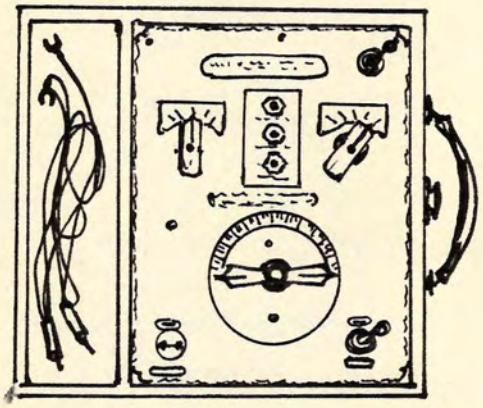
V. If circuit is resistance-coupled, normal reading on Meter 4 will be very low; if high - e.g., 5 mA or higher - resistor is shorted.

VI. If readings are equal, a short exists. (See IP note above.) If no short exists, grid reading should be much lower.

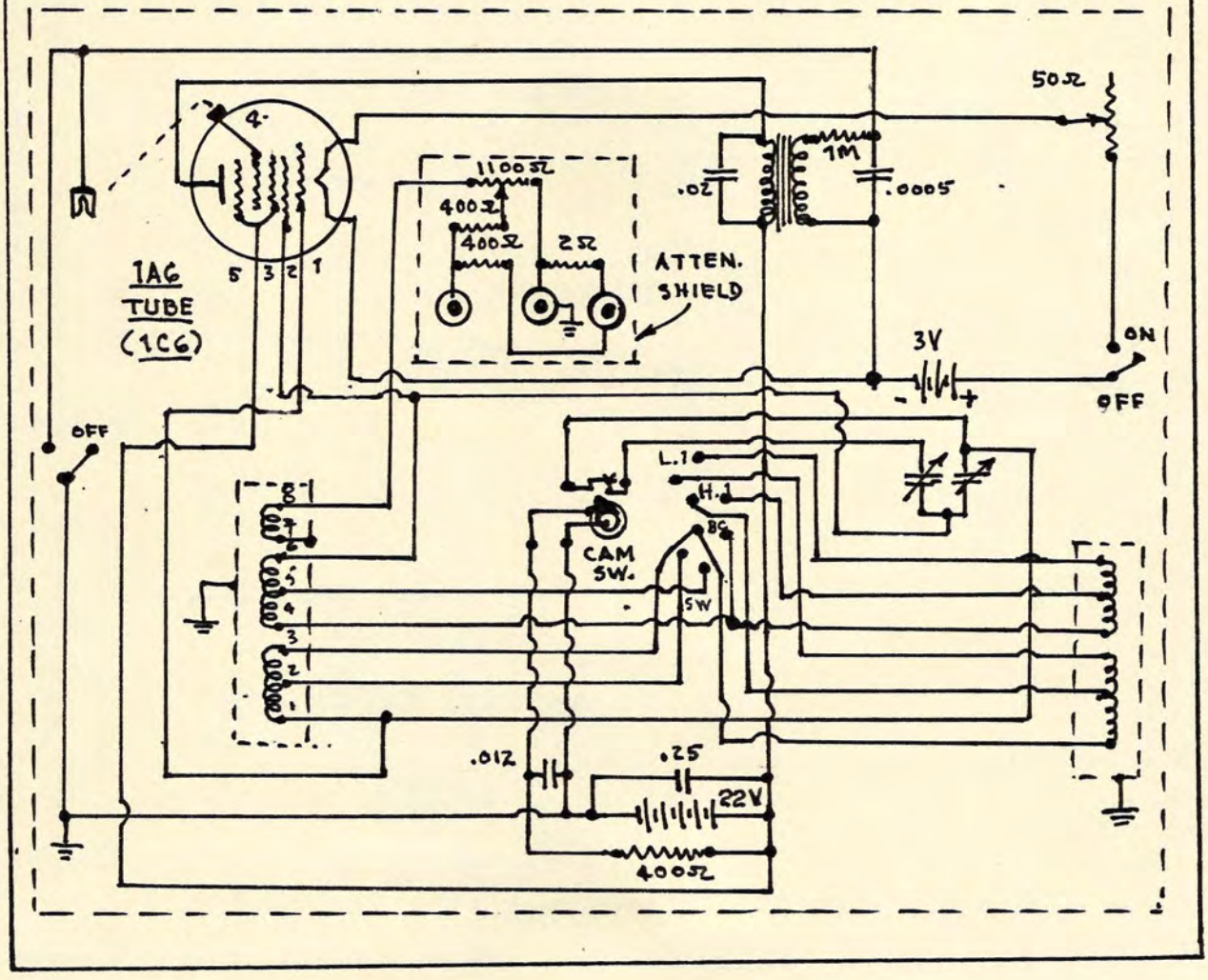
VII. The 71A tube tales 40V negative grid bias.


WIRELESS EGERT Model 99
ALL-WAVE TEST OSCILLATOR
(100 - 21,000KC)
ATTENUATOR
RF
OUT
AF
.006
MOD. COIL
LB
1A6
30
"A"
L1
L2
L3
L4
L5
L6
L7
RATIO 14:1
OSC. COILS
NOTES:
1. 7-POINT 2-GANG SW.
2. FUNDAMENTAL FREQS.
3. 1000~ AUDIO SIGNAL.
4. UNMODULATED SIGNAL MAY BE OBTAINED BY SHORTING AF PIN JACKS.
5. ATTENUATOR WAS THE LOGARITHMIC OUTPUT TYPE, IN MICROVOLTS.
RANGE
AF
BAND SW
RF

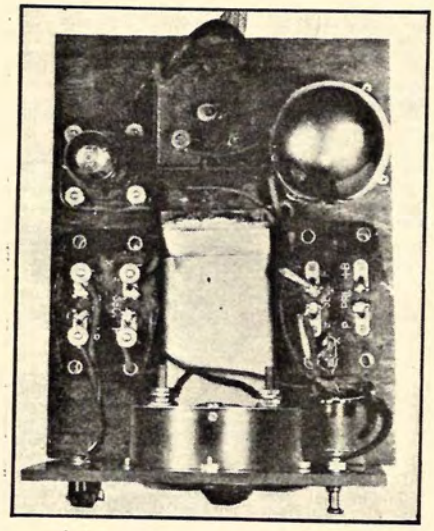
WESTON Model 694 TEST OSCILLATOR
(Battery Operated)

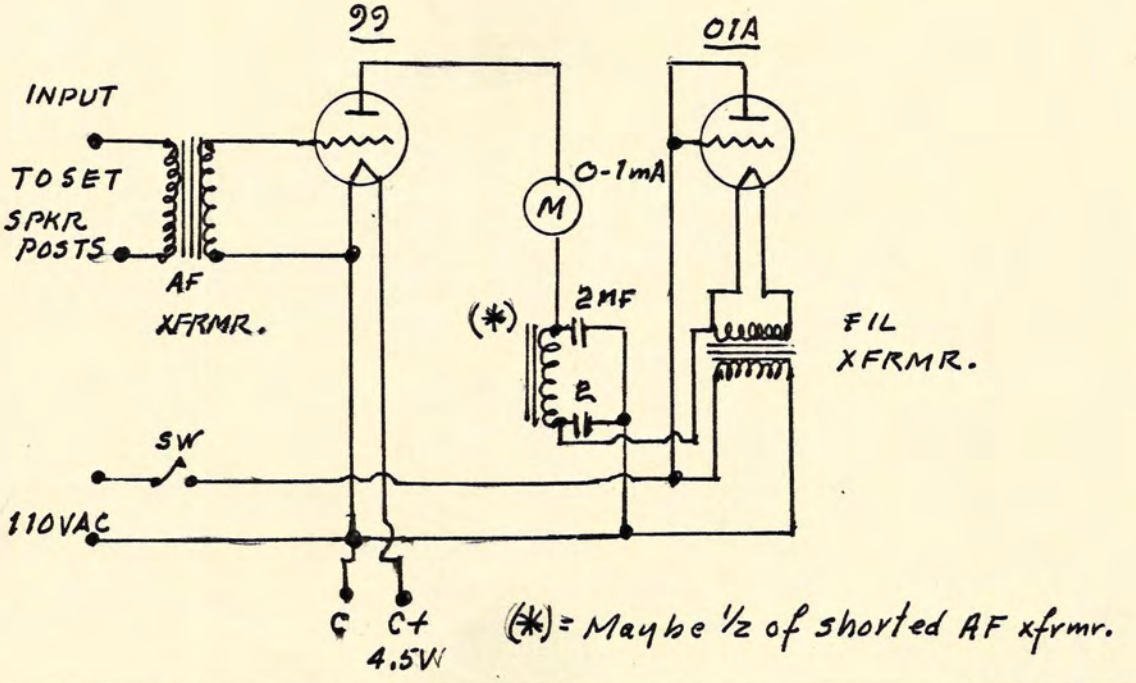


CAM SWITCH SETTINGS:
BAND L_1 = 100-300KC
H_1 = 200-600KC
BC = 500-1600KC
SW = 1,500-3000KC

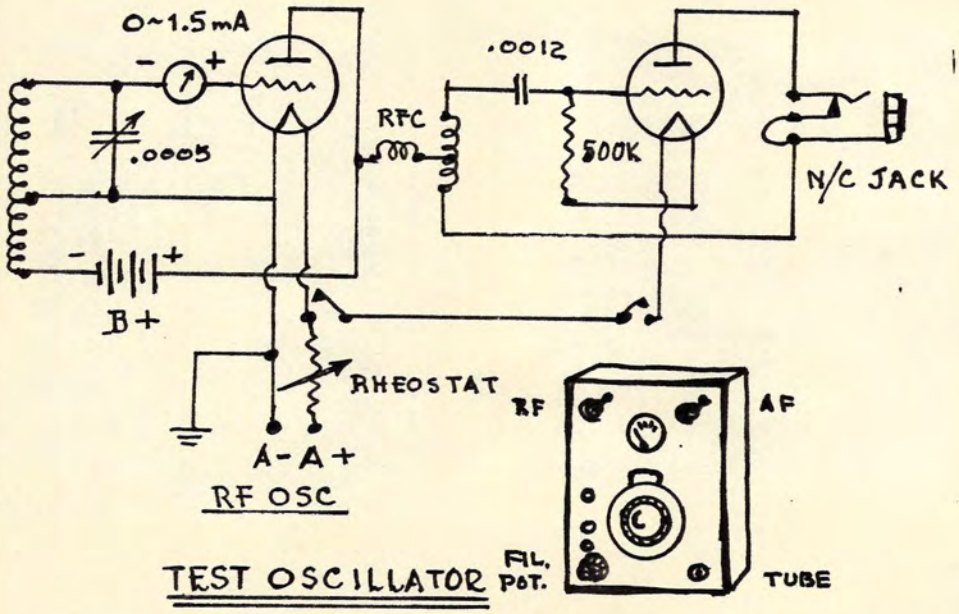


R.B. OUTPUT METER; 1927



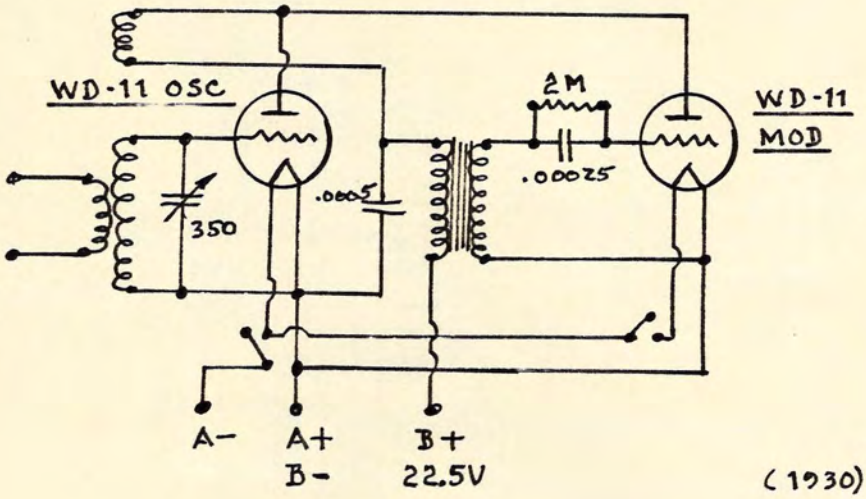


R.B. TEST OSCILLATORS, 1927



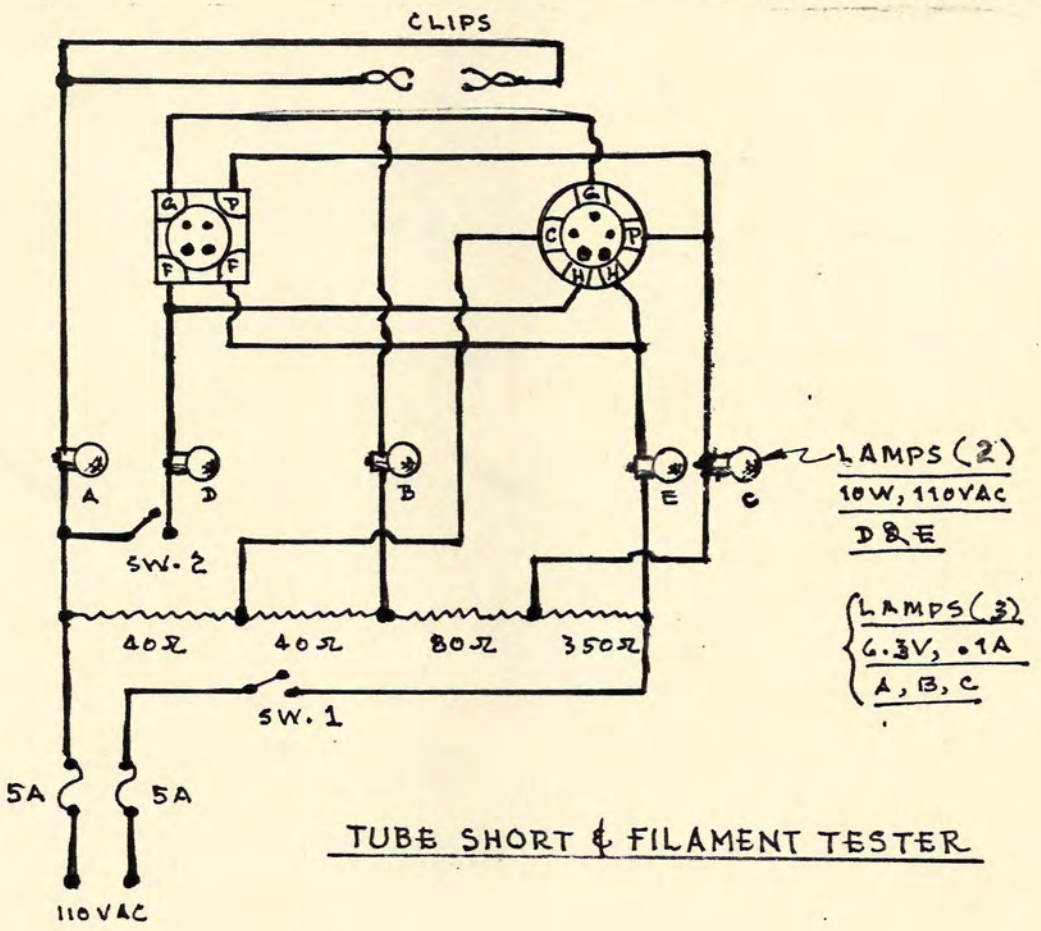
TEST OSCILLATOR

NAT'L. "N" DIAL



(1930)

R.B. TUBE TESTER #3, 1929



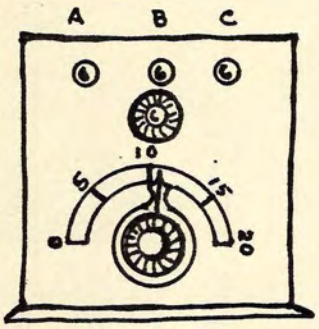
TUBE SHORT & FILAMENT TESTER

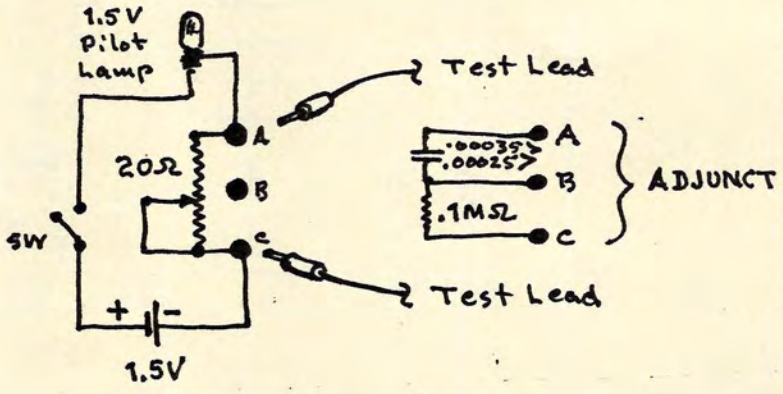
PROCEDURE:
1. When SW. 2 is closed lamps D&E should light with equal brilliance. If lamps other than D&E light, a short exists.
2. Short or open filament is indicated by one lamp lighted, one lamp is dimmer than the other, or no light at all.
3. For a normal tube, no lamps should light when SW. is closed.
4. If any lamp lights before switch is closed, check below:

Lamps Lit	Type of Short
A	Grid-cathode (control grid)
B	Grid-cathode or screen-grid.
C	Plate cathode.
A&B	Screen-grid (control grid)
A&C	Plate control grid
B&C	Grid - Plate
E	Heater-cathode
A&E	Heater or filament; control grid
B&E	Heater or filament; grid
C&E	Heater or filament; plate

(RB 1-29)

SHORT/OPEN/GOOD TESTER, 1929

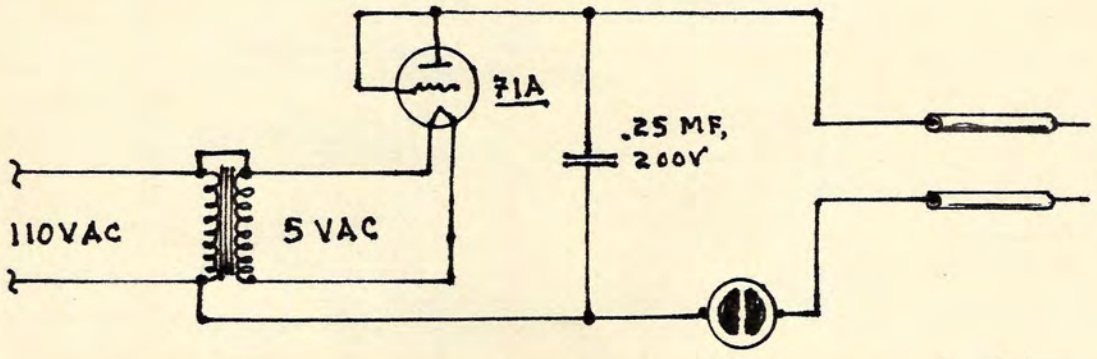




NOTES:

1. Test RF stages with no power; test AF stages with power on, using ADJUNCT (see above):
   a. If plate circuit is open; determined by connecting a resistor from plate to B+ and condenser next to tube grid. Signal should pass.
   b. "B" of ADJUNCT goes to plate; "C: to B+; "A" to open side.
   c. If no change occurs, reverse ADJUNCT connexions; if signal passes, SEC is open.
2. Lamp will always light on shorted circuits in RF stages.
3. Lamp will not light on open circuits in AF stages.
4. Lamp will normally draw 200 mA (0.2A); filament ohmage is 7.5-ohms. Resistance values to be judged must always be less than 20-ohms.
5. ADJUNCT is used for testing AF stages only.
6. Current in lamp = 1.5/27.5 (65 mA/0.065 A).

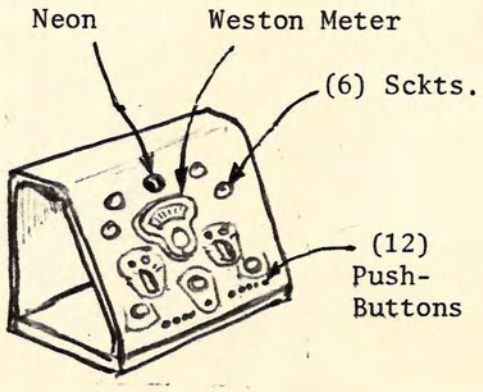
NEON-LAMP CONDENSER TESTER:



SUPREME TEST EQUIPMENT I.D. NUMBERS

Model Designation:	Function:
17	Tube Checker
18	Counter Tube-Seller
33	Ohmeter
35	Tube Tester
40	Portable Tube Tester
44	DC Volt-Ohmeter
56	Set Analyzer
57	Decade Resistance Box
60	"Handy" Test Oscillator
61	Test Oscillator
62	Tube Testing Power Unit
66	"Tube-O-Meter" Tube Tester
70	Shielded Oscillator Output-Ohmeter
75	AC-DC Volt-Ohmeter
77	Universal Analyzer Converter
85	Tube Tester
88	Leakage Tester - DCV Meter
89-D	Set Analyzer
90	Set Analyzer
111	V-O Meter
180	Test Oscillator
333	Set Analyzer
385-A	Set Analyzer
551	VTVM
AAA-1	"Diagometer" Set Analyzer

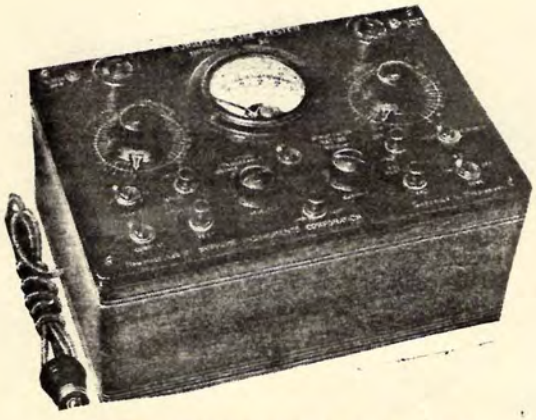
* * *



SUPREME
COUNTER TUBE TESTER
Model 66, 1936

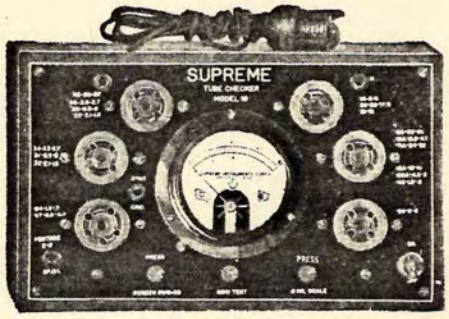
REPRESENTATIVE SUPREME TEST EQUIPMENT

TUBE CHECKER Model 17
($21.75)

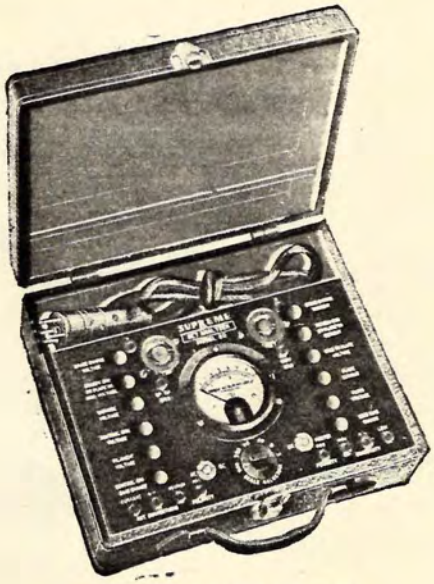


TUBE TESTER Model 50
($98.50)

OHMETER
Model 10
($18.50)

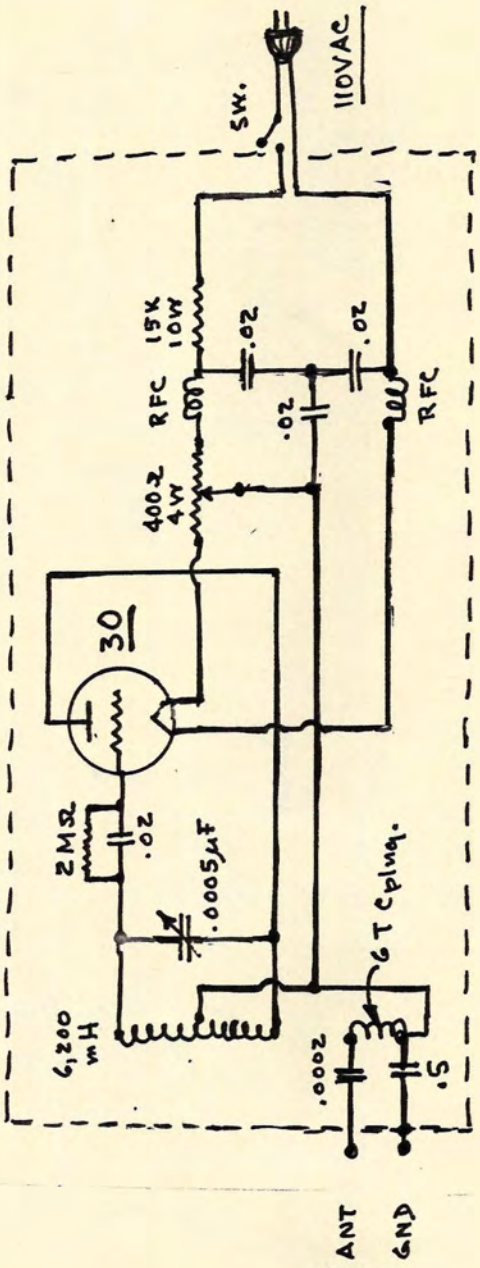


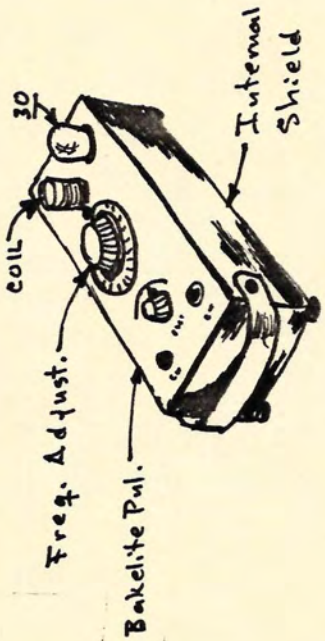
TUBE CHECKER Model 19

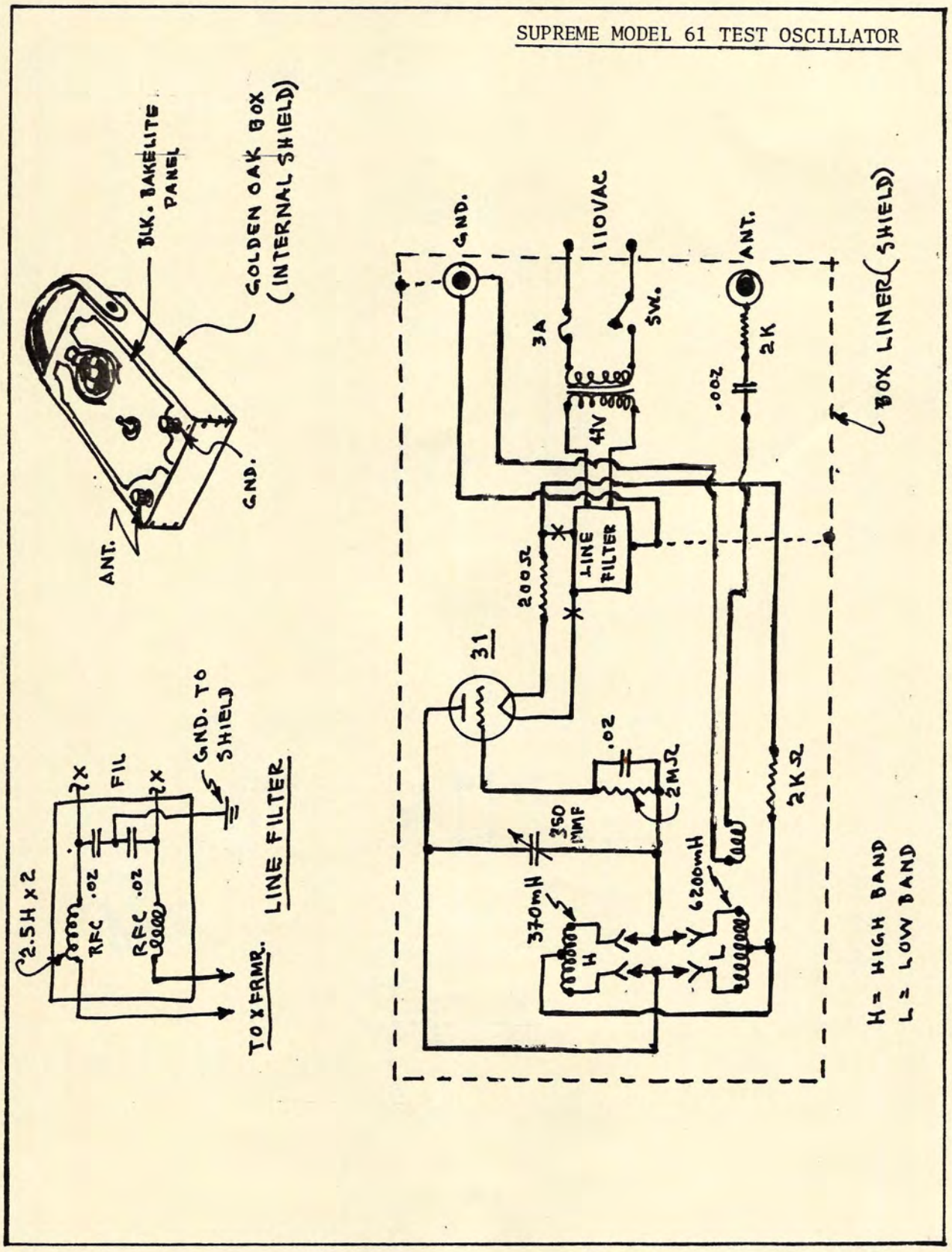


SET ANALYZER
Model 90

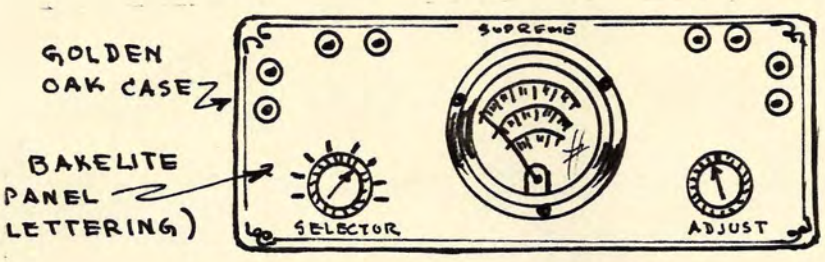
SUPREME TEST OSCILLATOR, MODEL 60, 1929
90-1500 KC Tuning Coils Required



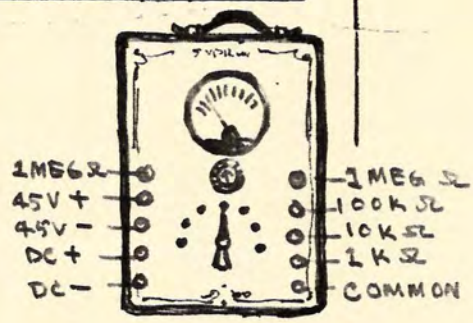



SUPREME MODEL 61 TEST OSCILLATOR
BLK. BAKELITE PANEL
GOLDEN OAK BOX (INTERNAL SHIELD)
GND.
ANT.
GND.
110VAC
ANT.
3A
SW.
2K
.002
4V
BOX LINER (SHIELD)
LINE FILTER
200Ω
31
.02
2MΩ
350 MMF
370mH
620mH
2KΩ
H
L
H = HIGH BAND
L = LOW BAND
2X
FIL
2X
GND. TO SHIELD
2.5H x 2
RFC .02
RFC .02
LINE FILTER
TO XFRMR.

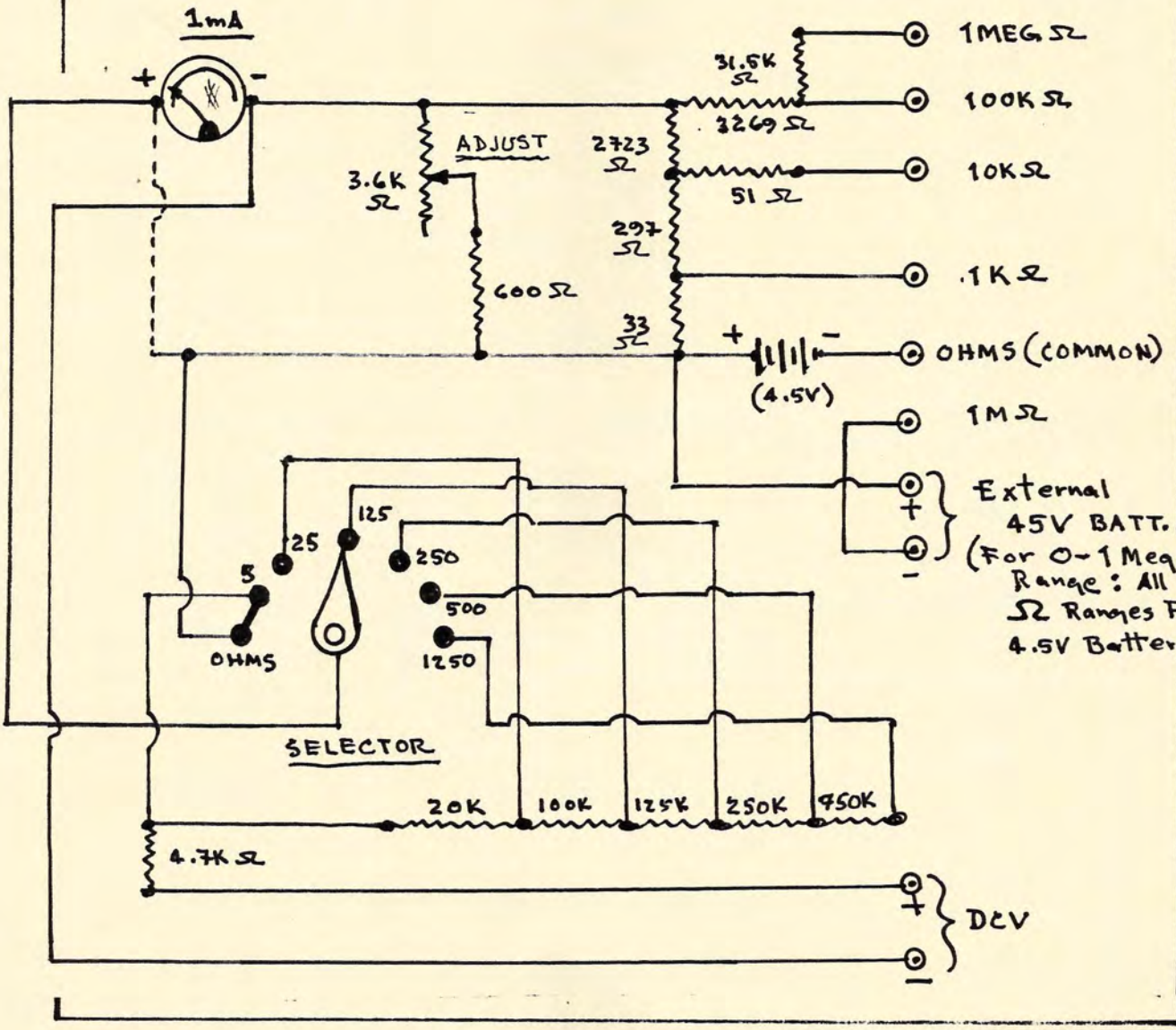
SUPREME V-O METER, MODEL 111



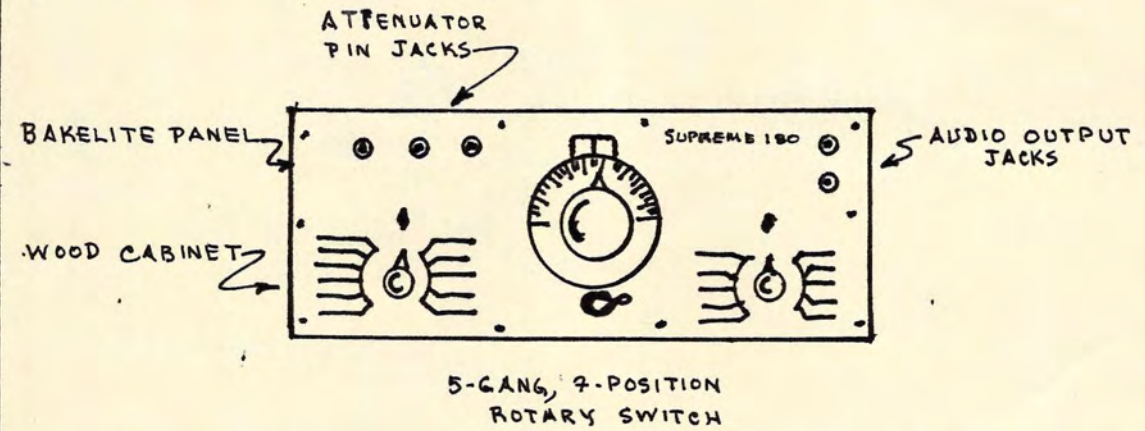
FINAL CABINET DESIGN

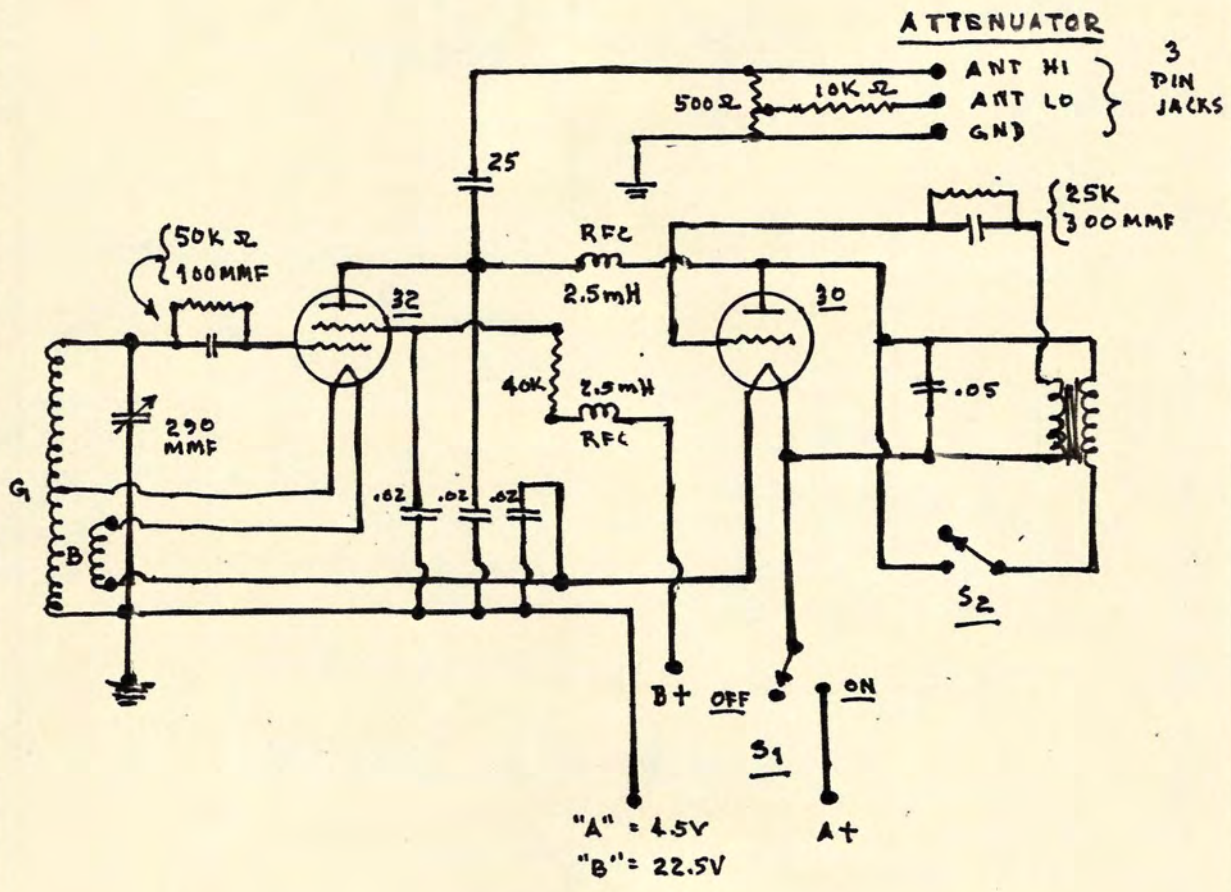


(EARLY CABINET DESIGN)



SUPREME MODEL 180 TEST OSCILLATOR
(Sht. 1)





SUPREME MODEL 180 TEST OSCILLATOR
(Sht. 2)

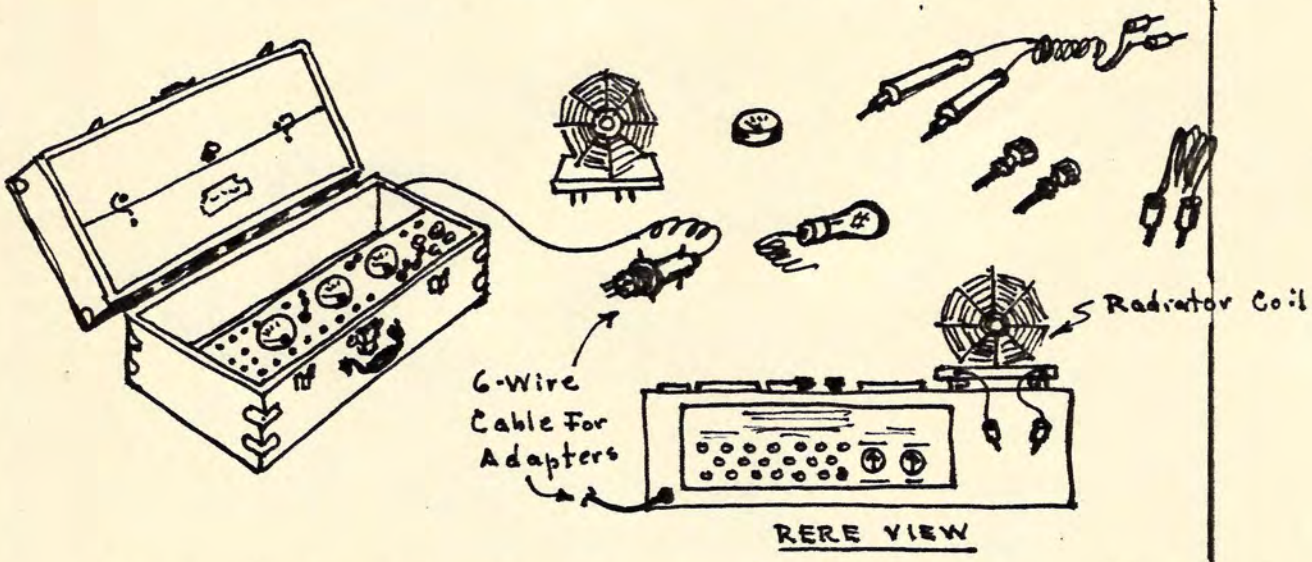
NOTES, GENERAL

1. Accuracy = ± 0.5%.
2. Modulation may be shut off by SW #2.
3. Voltage across attenuator is RF modulated at 50%, 400 cycles.
4. SEVEN sets of OSC coils required; one set shown.
5. "G" = main coil; "B" = oscillator coil.
6. 30 tube = modulator; 32 tube = Hight Frequency oscillator circuit.
7. Unit is separately modulated, battery operated, all-wave oscillator, electron-coupled type.
8. OSC coils are switched by 5-gang rotary switch: 3 of the switch gangs cut-in GRID, TAP, GND of main coil "G". The other 2 gangs are used to switch "B" coils.
9. Modulator circuit uses an AF xfrmr. in conventional connexions: one winding in plate circuit couples to the other winding in the grid circuit.

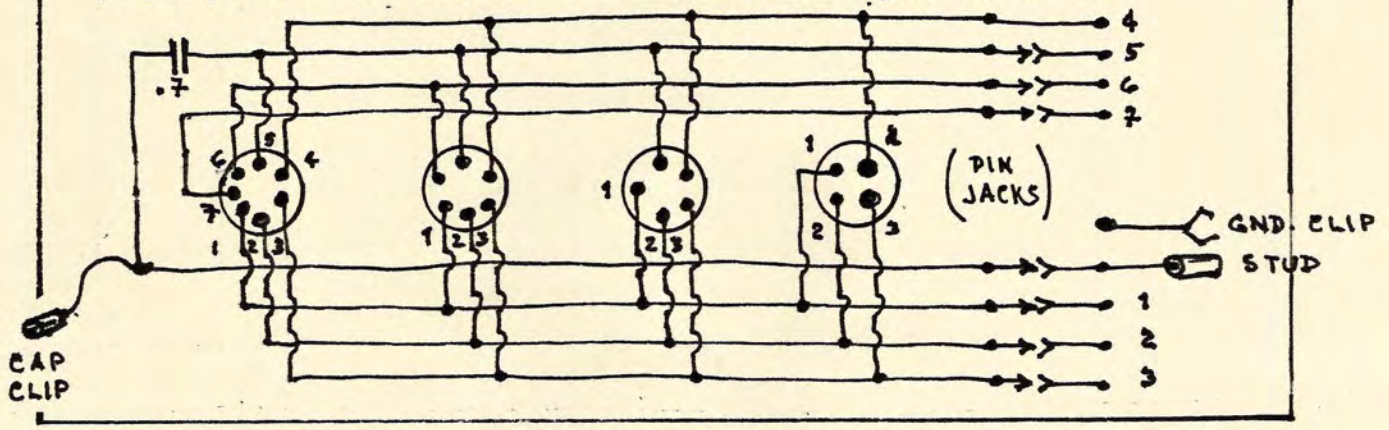
SUPREME MODEL 385 SET ANALYZER, 1929
Floyd Fausett, Ch. Eng. Sht. 1

GENERAL DATA: This instrument provided the following:

Tube-socket Analyzer	Tube Tester
Modulated Oscillator	Continuity Indicator
Neutralizing Adapter	Modulated Signal Output
80 Plate Tester	Universal Analyzer Plug
DC mA Meter	AC Voltmeter
Thermocouple Meter (mA)	Oscillator
Plate Voltage Measurements	Current Measurements
40 Different Circuits	Meter Fuses
11 Scales via Pin-Jacks	Internal Xfrmr. SEC 1.5 - 15V.

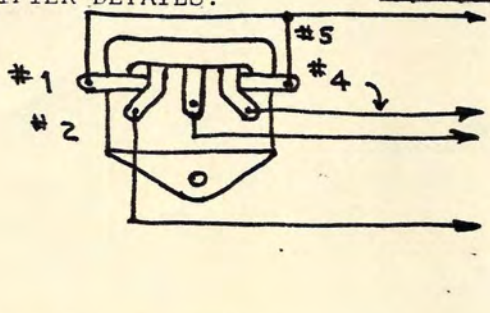


1) SET ANALYZER sexion employs the point-to-point system. The cable is a 9-wire type, terminating in a 6 or 7-prong plug.The long lead with clip is for grounding the instrument to the set chassis. For CURRENT MEASUREMENT rotate switch to DC mA; for VOLTAGE RANGE, insert test probe into proper pin-jack at tube, the other end into test jack on the 385.



SUPREME MODEL 385 SET ANALYZER, Sht. 2

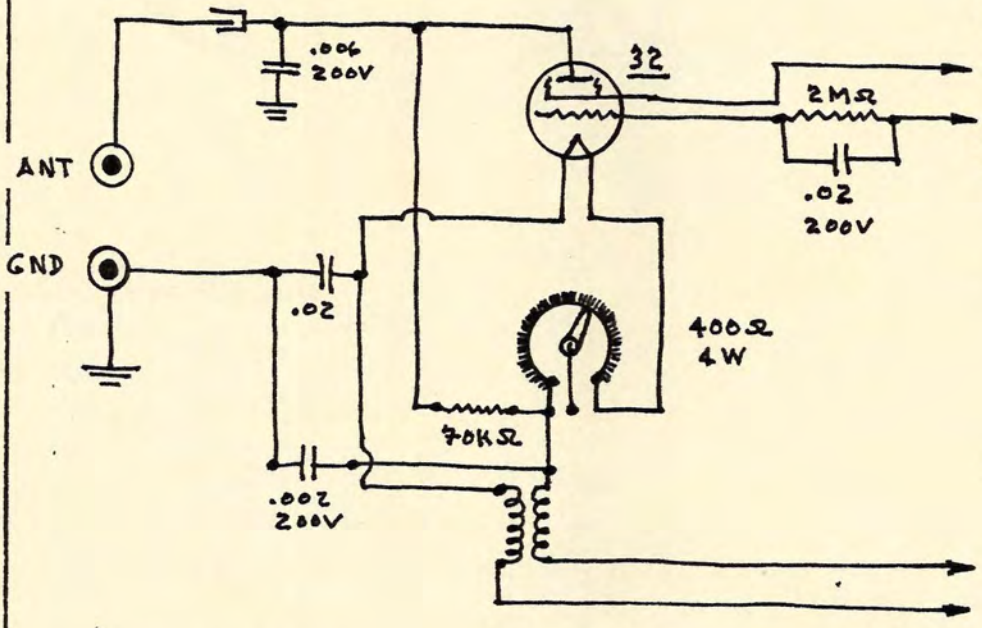
2) RECTIFIER DETAILS:



(32 Tube; 10A Fuse)

TABS #	Resistance from #1 tab.
1	
2	117 ohms
3	219 ohms
4	0 ohms
5	200 ohms

3) DETECTOR ANALYSIS SEXION:



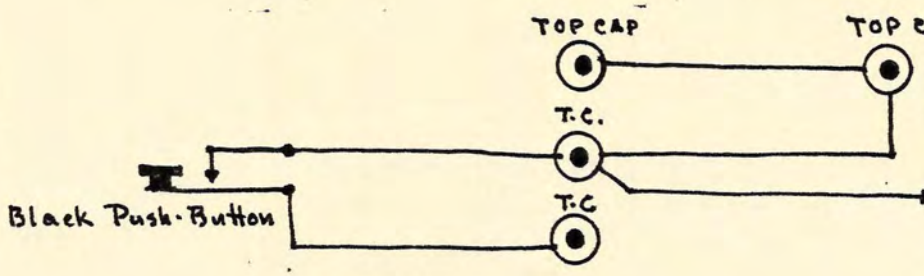
Front deck of 3-deck switch; common to all caps. & choke.

2nd Deck of 3-deck Switch

10A Fuse

1500 ohm Resist. in line to Tube Tester OSC pad.

4) TOP-CAP LEAD CONNEXIONS:

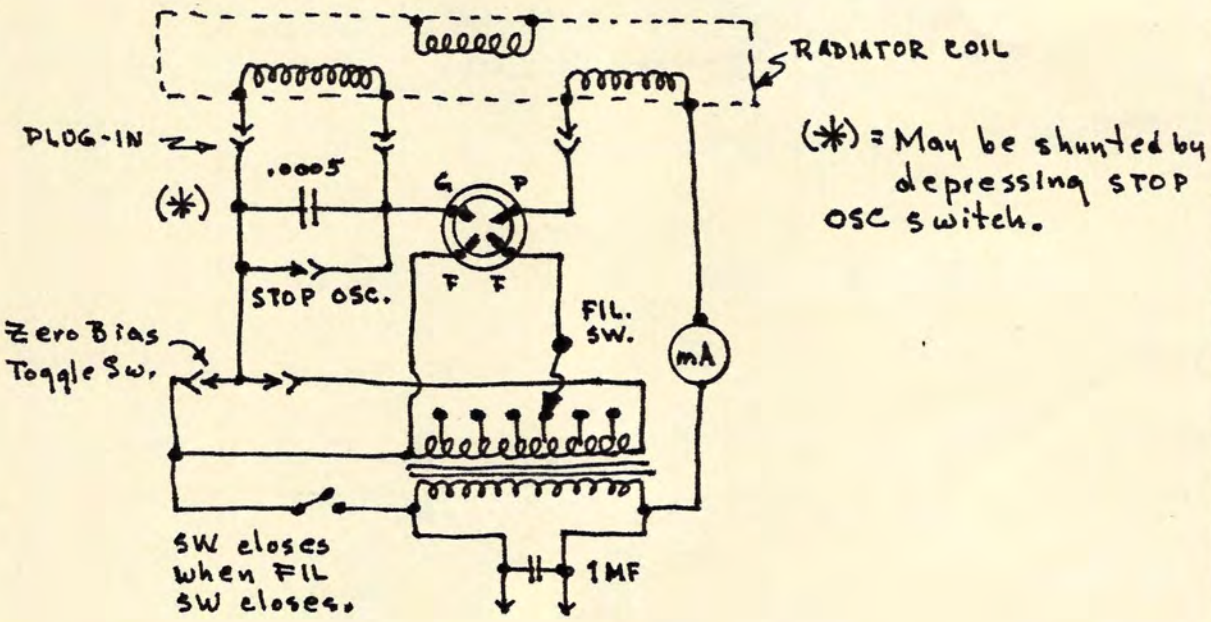


Tip-Jacks

To Blank Tab on Top-Cap top front deck on 6-deck rotary switch.

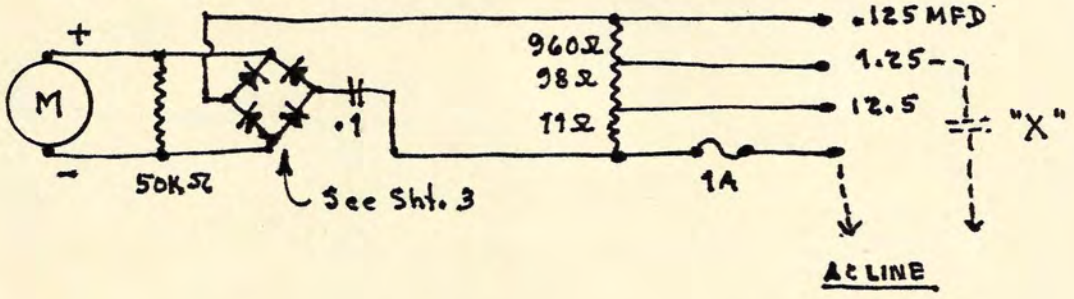
SUPREME MODEL 385 SET ANALYZER, Sht. 3

5) SELF-RECTIFYING TUBE-TEST CIRCUIT & MODULATED RADIATOR:

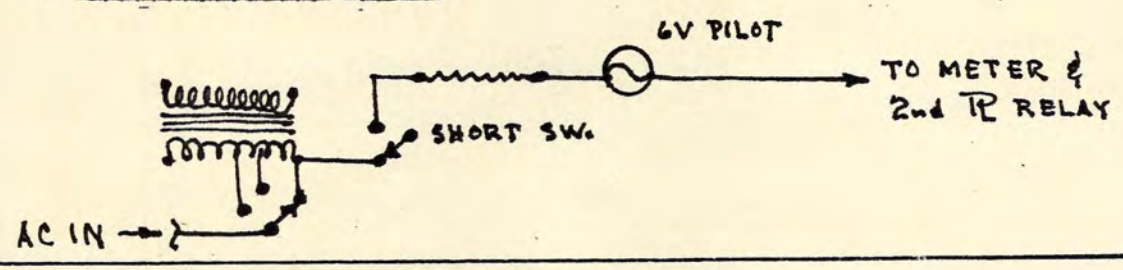


6) CAPACITY METER:

Condenser to be measured is connected between proper terminals on the panel, and one side of the AC line. In sketch below "X" is connected to the 1.25 MFD range terminal. Resistance shown acts as multipliers.

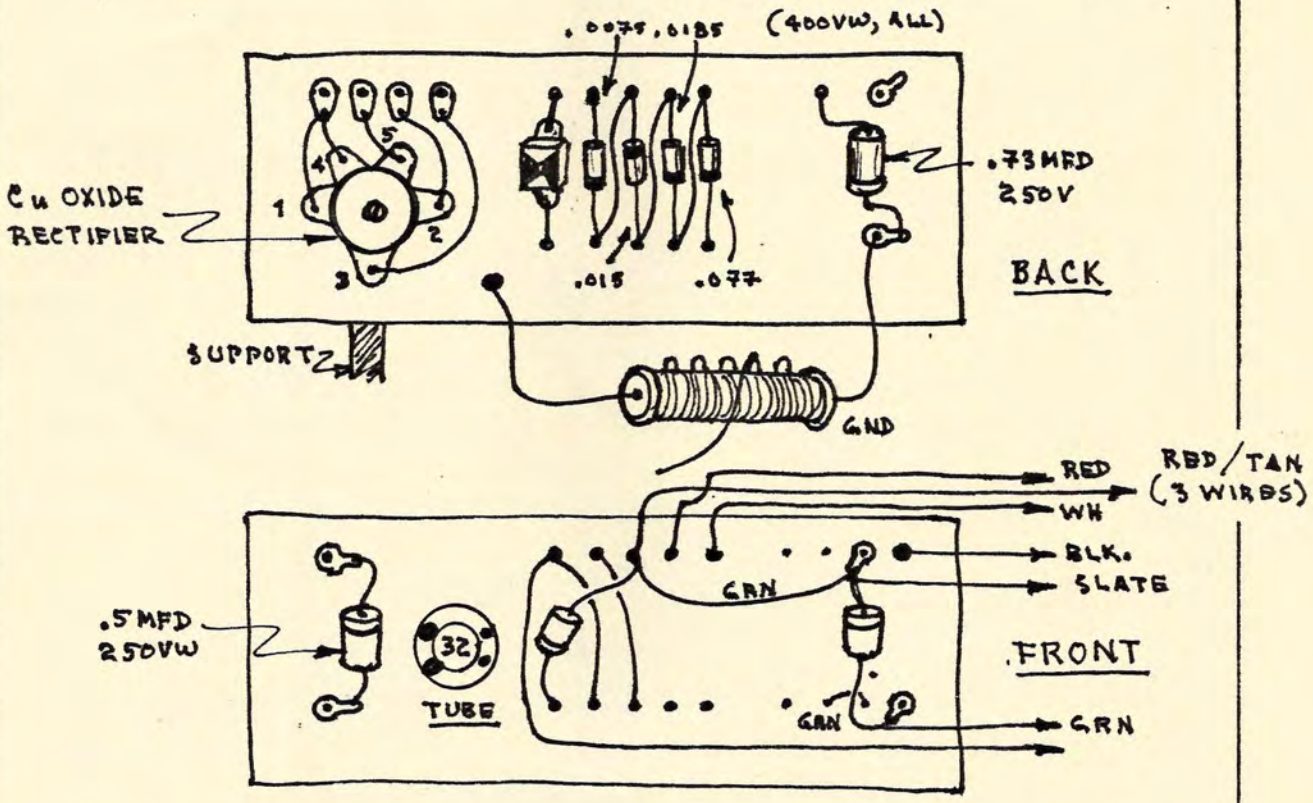


7) "SHORT" TEST CIRCUITRY:

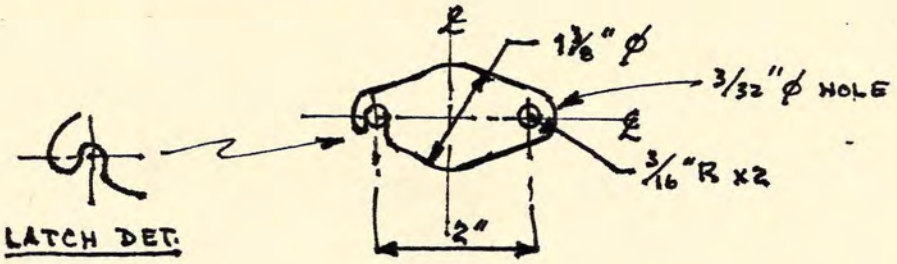


SUPREME MODEL 385 SET ANALYZER, Sht. 4

8) CAPACITOR/CONDENSER PANEL DETAILS:



9) BATTERY COMPARTMENT COVER:

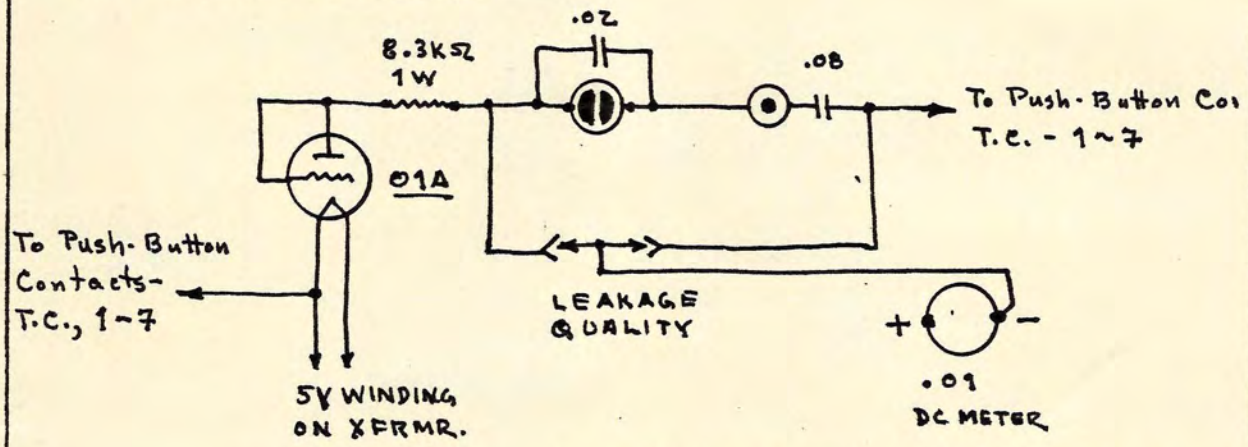


10) Neon lamp (GE NE 34) used for non-electrolytic leakage tests.

11) This model analyzer incorporates all of the features of SUPREME's Model 333 DeLuxe Analyzer & Model 85 Tube Tester. Therefore, the electrical circuitry for these two instruments are not shown elsewhere in this volume.

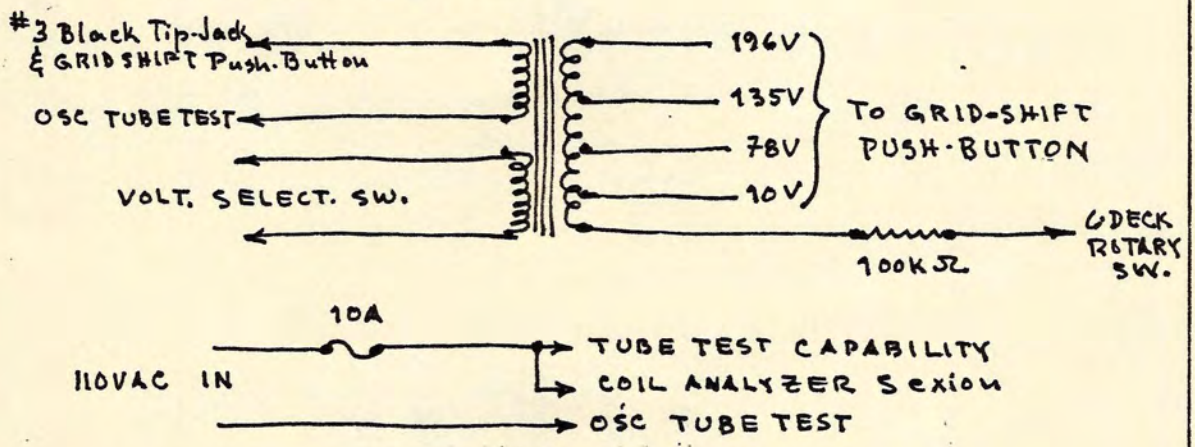
SUPREME MODEL 385 SET ANALYZER, Sht. 5

12) LEAKAGE TEST CIRCUIT:



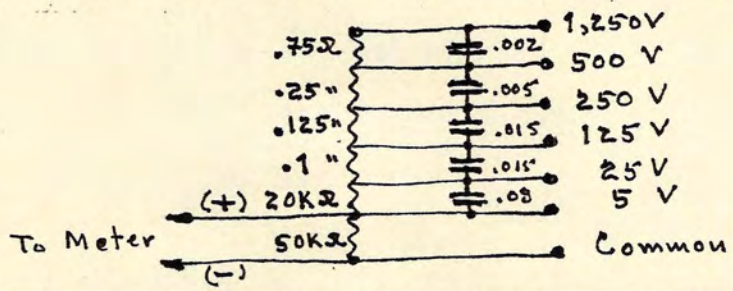
NOTE: See also SUPREME Model 866-A

13) POWER TRANSFORMER DETAILS:



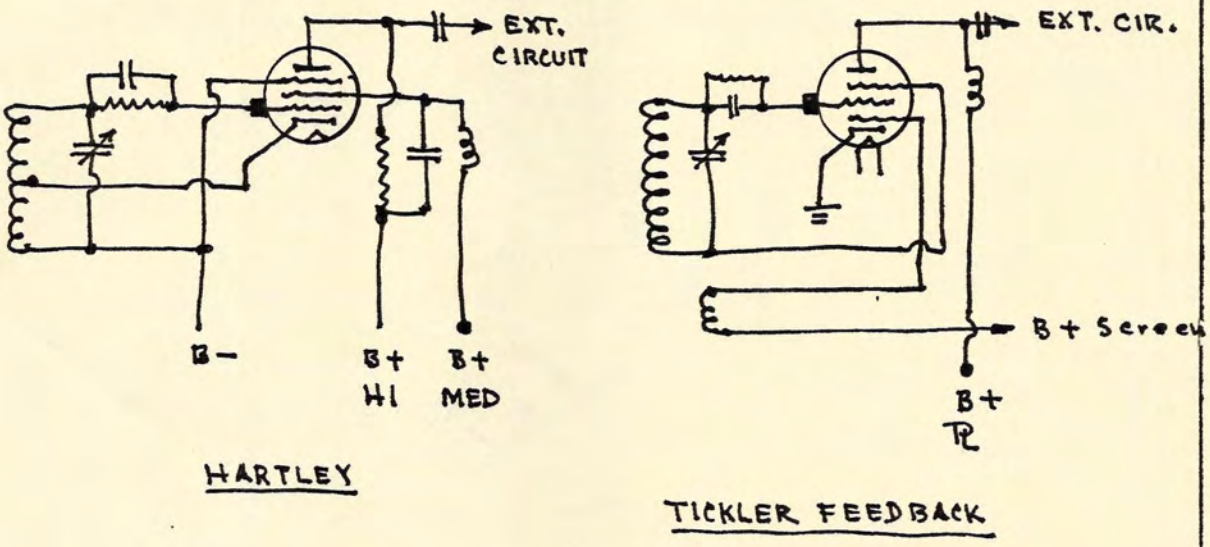
14) VOLTAGE MEASUREMENTS:

AC/DC multiplier connexions are shown below. Shunting condenser act as compensators when ACV is measured, and make the deflexions for AC the same as DC. Capacitors in MFD.

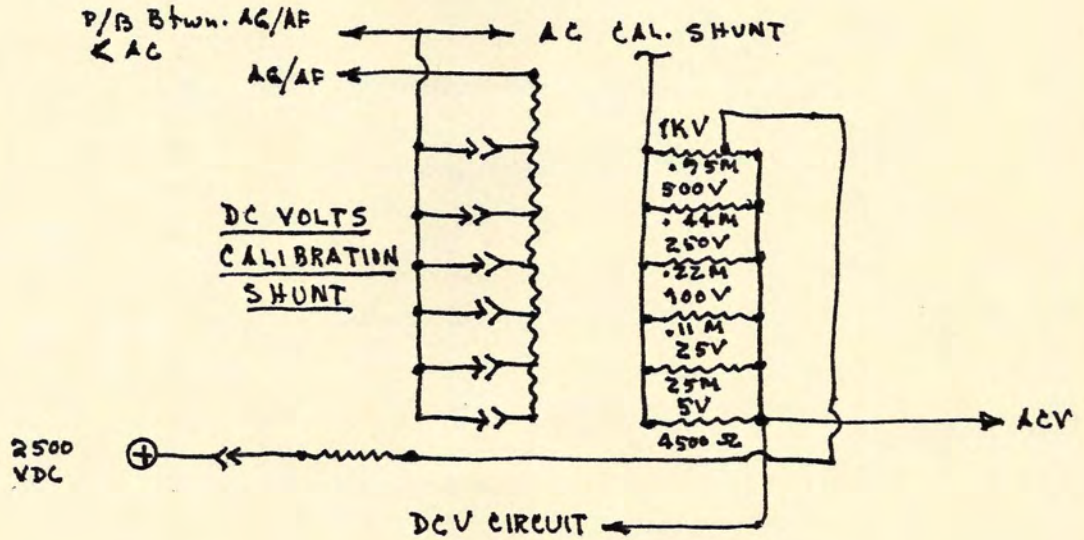


SUPREME MODEL 385 SET ANALYZER, Sht. 6

15) ELECTRON-COUPLED OSCILLATOR (In Analyzer Sexion):

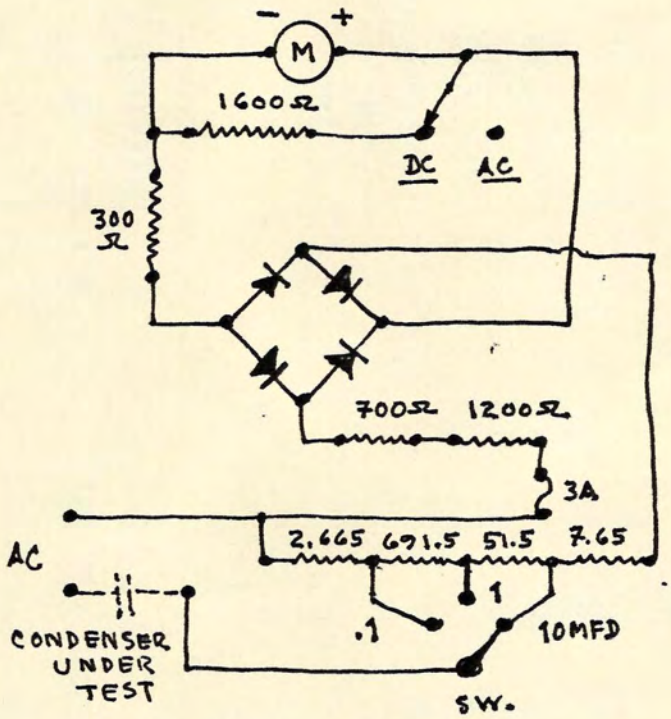


16) DC VOLT CIRCUIT:

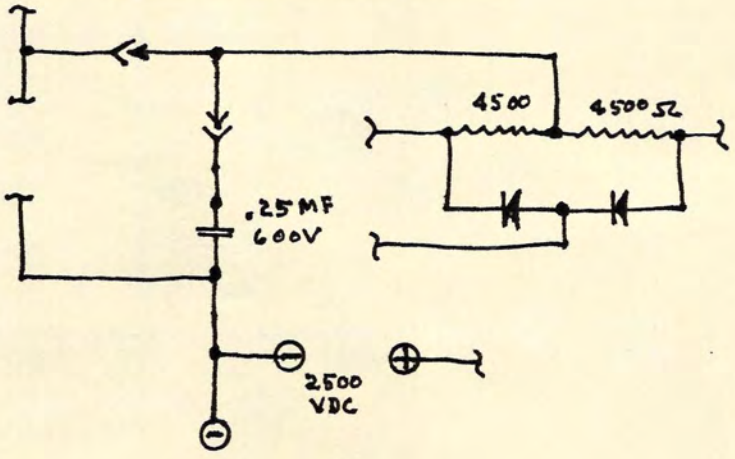


SUPREME MODEL 385 SET ANALYZER, Sht. 7

17) CAPACITY MEASUREMENT CIRCUIT #2 (TYP):

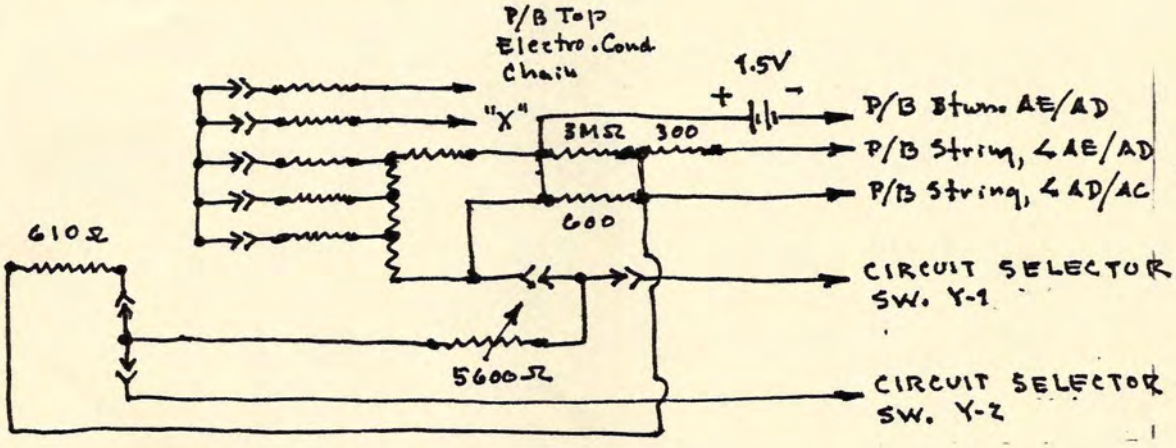


SUPREME METER RECTIFIER CIRCUIT:

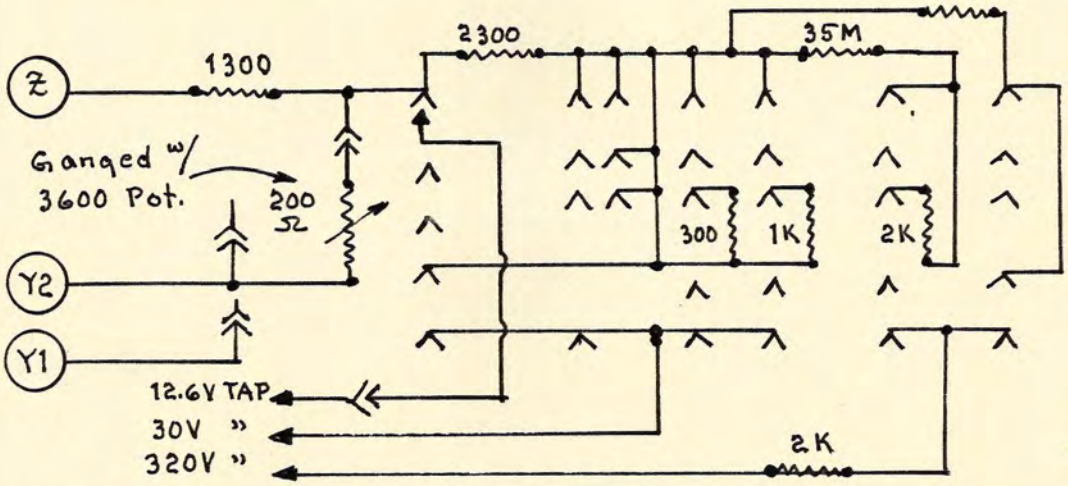


SUPREME MODEL 385 SET ANALYZER, Sht. 8

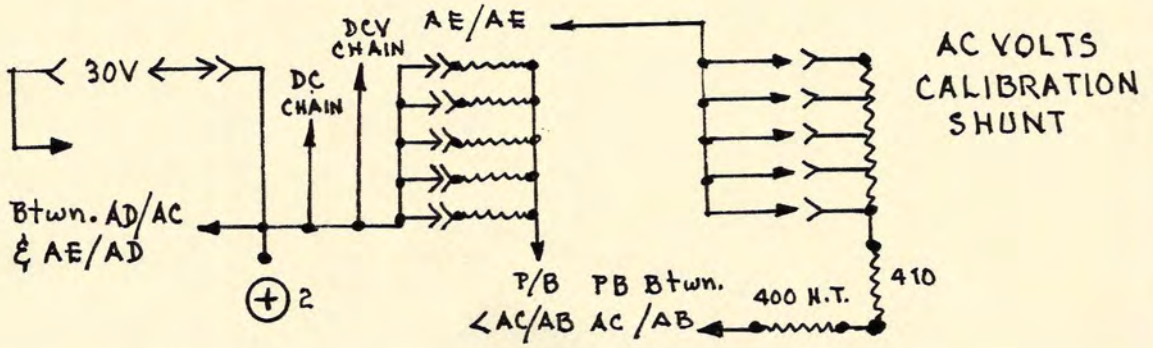
18) OHMS - MEGOHMS CIRCUIT:



19) CIRCUIT SELECTOR CIRCUITS:



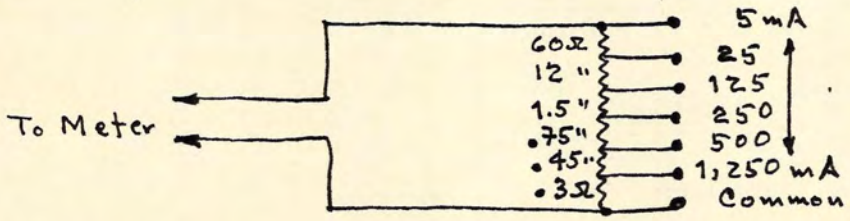
20) AC VOLTAGE MEASUREMENT CIRCUIT:



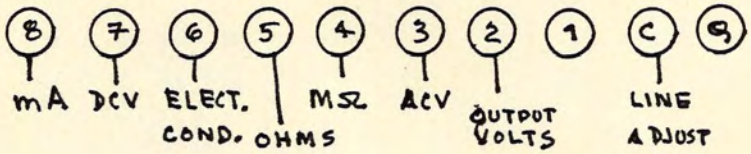
SUPREME MODEL 385 SET ANALYZER, Sht. 9

21) CURRENT MEASUREMENTS:

Circuit arrangement of shunts is in mA sexion. There are resistors in series with the meter as well as in parallel with the terminals in use. Thus, when the 125 mA range is selected, there is a 60 + 12-ohm (72-ohms) resistor-pair in series with the (+) lead of the meter, and the remaining resistors are in shunt with the terminals. The 1 mA meter is used for current measurements.

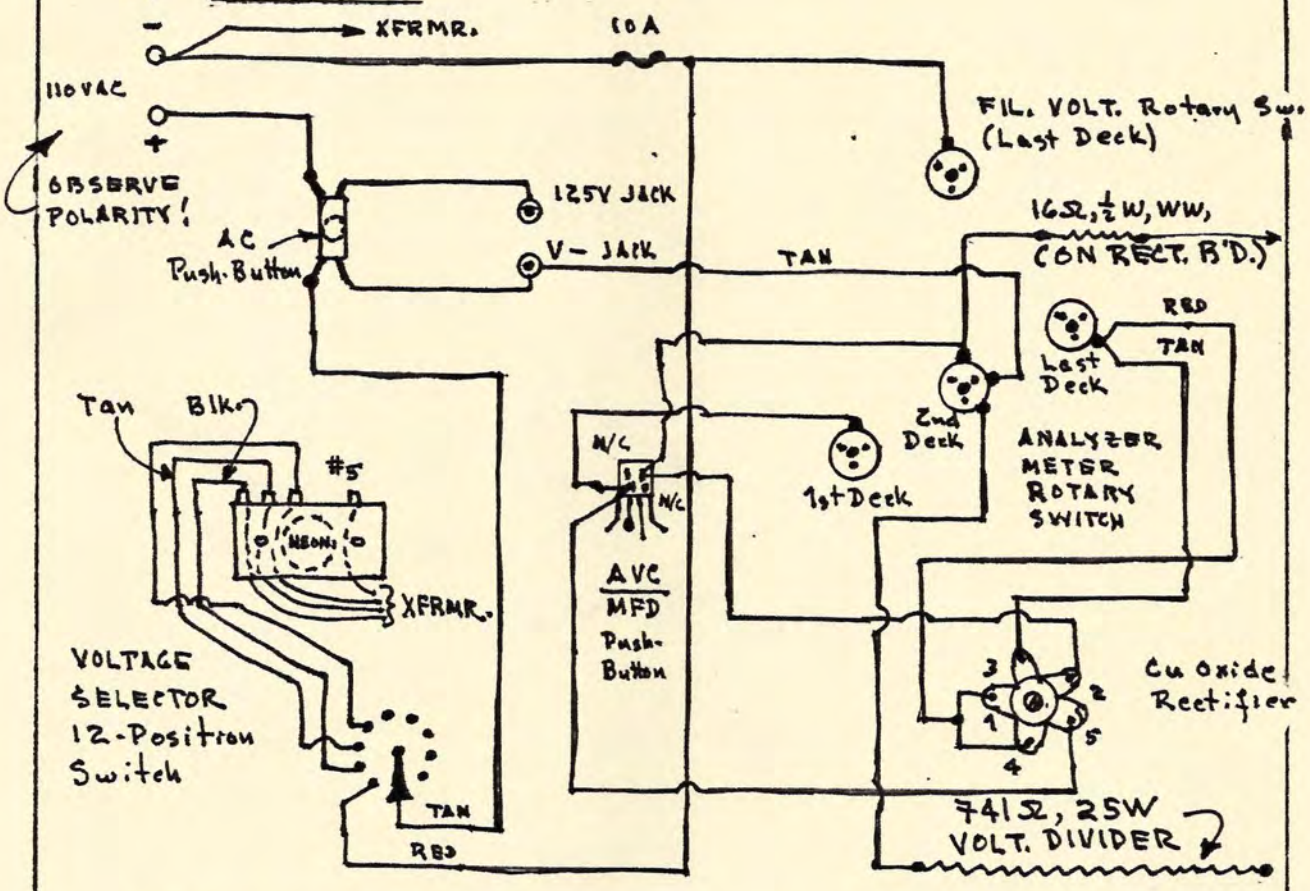


22) POSTS, JACKS, PUSH-BUTTON NOMENCLATURE:



SUPREME MODEL 385 SET ANALYZER, Sht. 10

23) GENERAL DATA:



1. Voltage selector switch automatically closes plate and oscillator circuits, and disconnects power from rest of instruments.
2. Master push-button checks line voltage.
3. Meter circuits protected by resistors and fuse.
4. 33 tube used as OSC for aligning variable capacitors.
5. DC voltmeter connected to V.C. (voice-coil) will indicate output strength of set under test.
6. Capacitance checked by two thermocoupled methods.
7. Test Oscillator has 2 ranges: 92-220 KC; 1500-3300 KC. Higher frequencies may be obtained by using harmonics. This oscillator is NOT equipt to handle control of the output. Output is modulated 100% at 60 cycles.
8. The 0-1 mA meter is connected to plate circuit of tube, and the socket terminals are connected to the row of 7 switches marked for special circuits.

SUPREME 385 COMPONENTS

Rheostats & Pots.

400 ohms, 4 Watts
3,600 ohms, 3 Watts

10A Fuse
32 Tube

Capacitors

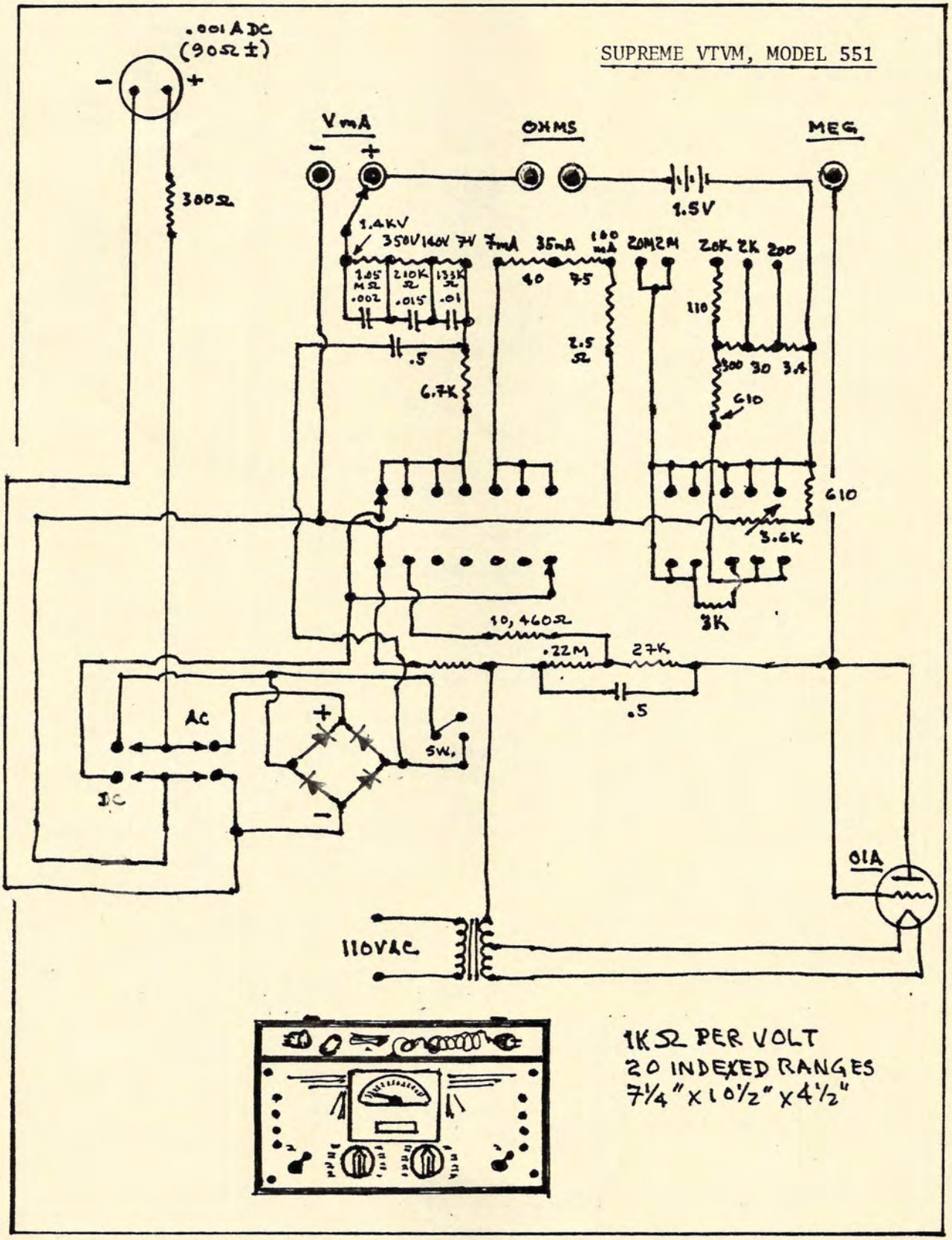
MFD	WV	MMFD
.02 (2)	200	40
.002	200	140 (3)
.002	600	220
		300
		275
.07 (2)	200	
.84	200	
1.0	200	
1.4	200	
1.68	200	
.08	25	
.096	25	
.114	25	
.116	25	
.192	25	
.015	200	
.018	200	
.021	200	
,03	200	
.036	200	
,006	200	
.0072	200	
.0086	200	
.012	200	
.0144	200	
.002	600	
.0024	600	
.0029	600	
.004	600	
.0048	600	

Resistors (In Ohms)

0.3	2M
0.45	750K
0.75	250K
1.5 (2)	125K
2.0	100K (2)
2.2	31.500
2.5	20K
3.3	10K
5.0	2,723
6.3	4,425 (3)
7.5	2,304
11	1,920
12 (2)	1,500
13.2	1,400 (3)
14	1,875 (3)
15.7	1,725 (3)
26.4	1,371
33	1,152
51	1K (2)
60	175 (3)
98	130 (3)
118	456 (3)
140	297
180 (3)	960
196	700
235	600 (4)
300	

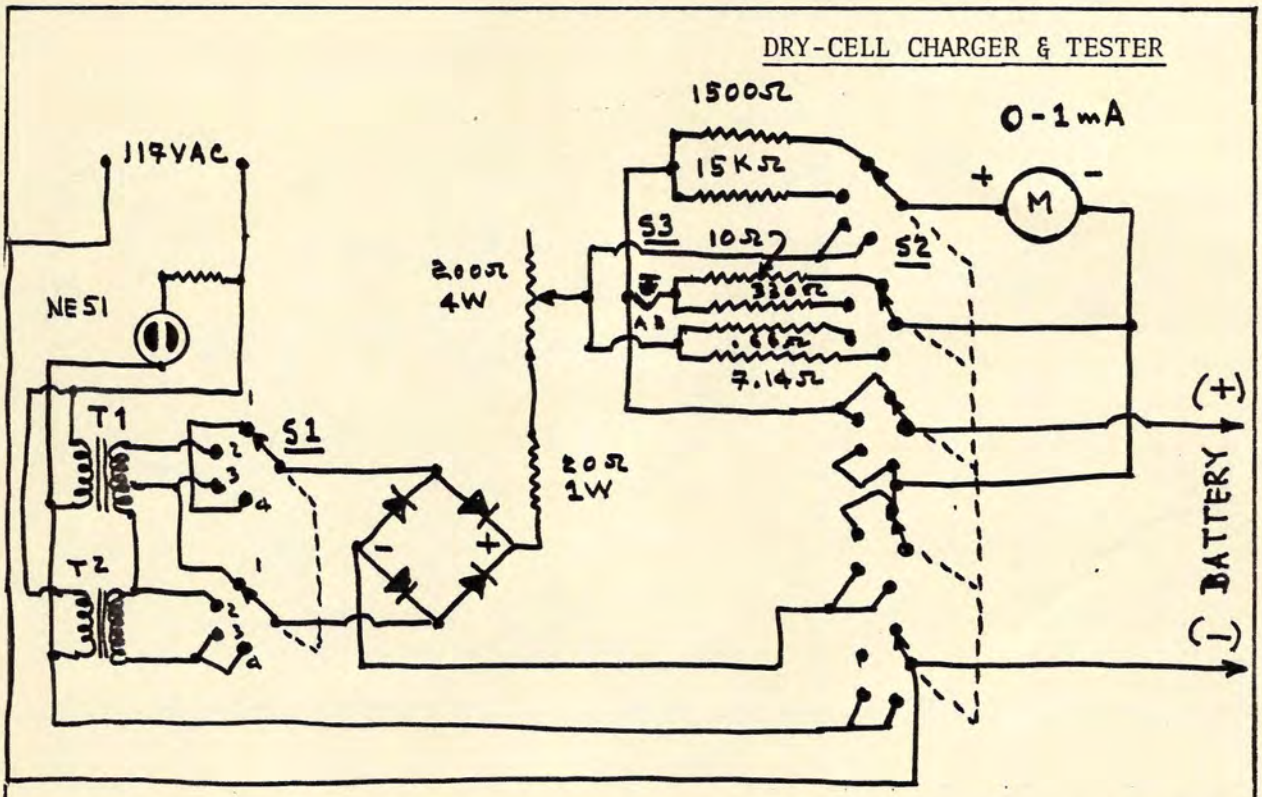
NOTE:

The majority of these resistors were wire-wound precision types, ± 2%.



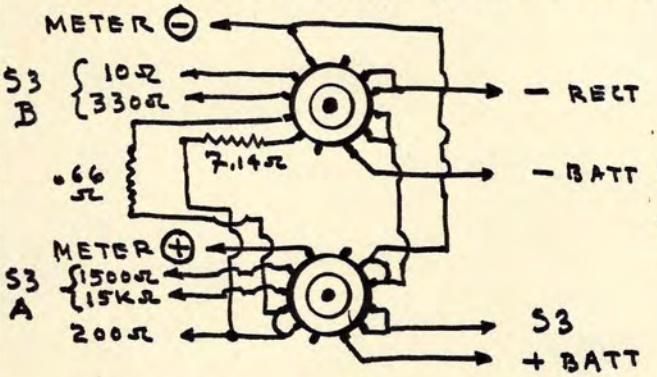
1KΩ PER VOLT
20 INDEXED RANGES
7¼" x 10½" x 4½"

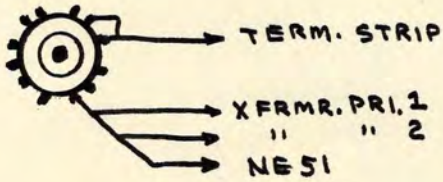
DRY-CELL CHARGER & TESTER

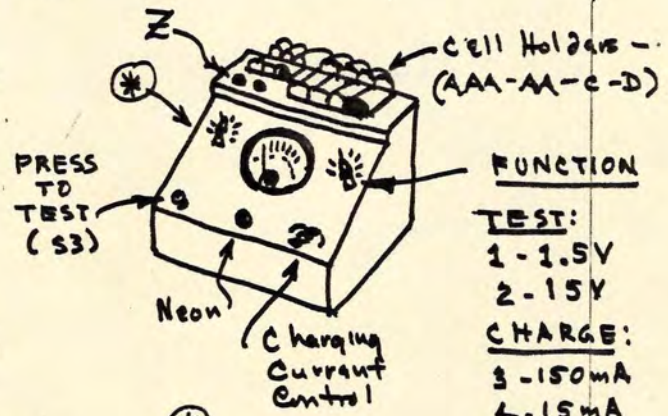


S1 = 2-pole, 4-position switch
S2 = 5-pole, 4-position switch
S3 - Normally open push-button switch

T1 = 6.3V FIL xfrmr., C.T., 1A
T2 - 6.3V FIL xfrmr., C.T., ½A



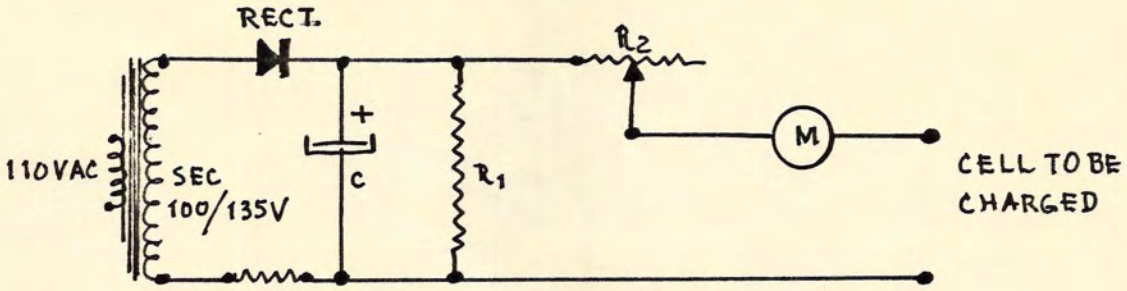




CHARGING VOLTAGE:
1 - Low
2 - Medium Low
3 - Medium High
4 - High

Z = Posts wired in parallel for cell holders that do not fit holders.

DRY-CELL BATTERY CHARGER DATA



Charging rate is at 10% of the nominal mA-hour capacity.

Rectifier = 115VAC, rated as required.

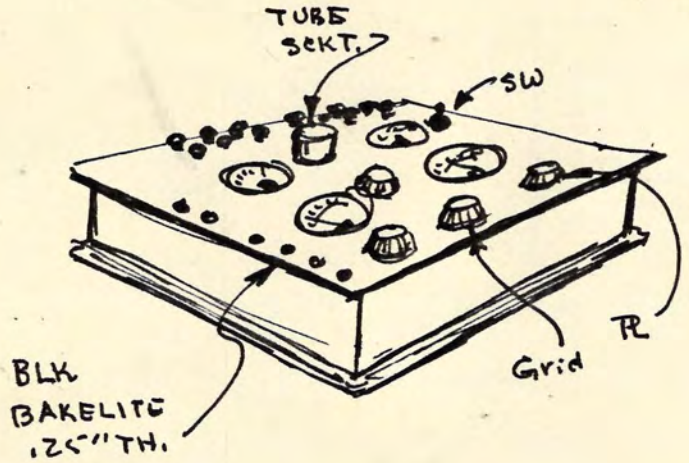
C = 10 MFD, 150VW
M = as required (see below)
R1 = 12K, 2W
R2 = as required (see below)

CHARGE CURRENT	R_1	R_2
2-16 mA	1K, 10W	50K, 10W
15-40 "	" "	5K, "
40-150 "	250-ohms, 10W	1K, "
150-250 mA	100-ohms, 10W	250-ohms, 10W

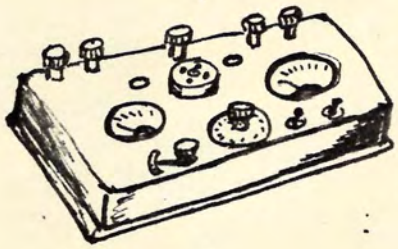
NOMINAL RATING	14 HOUR RATING
20 mAHr	2 mA
50 "	5 "
100 "	10 "
150 "	15 "
225 "	22.5 "
450 "	45 "
2,500 mAHr	250 mA

During a floating charge, maximum voltage should be 1.33 to 1.45 Volts per cell.

TUBE TESTERS IDENTIFICATION SKETCHES

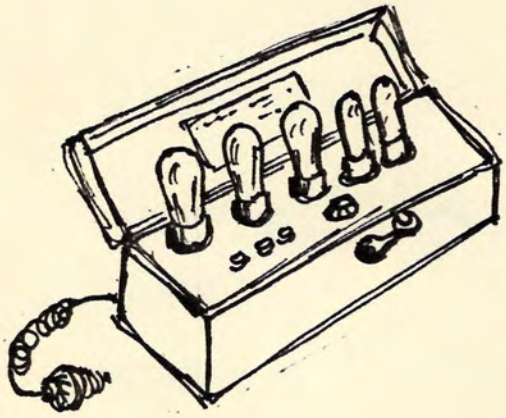


JEWELL PATTERN 130
1926



HOYT TUBE TESTER 400
1928; $35

Operable from mains,
DC or batteries in set.
AC tubes tested via
an added FIL xfrmr.



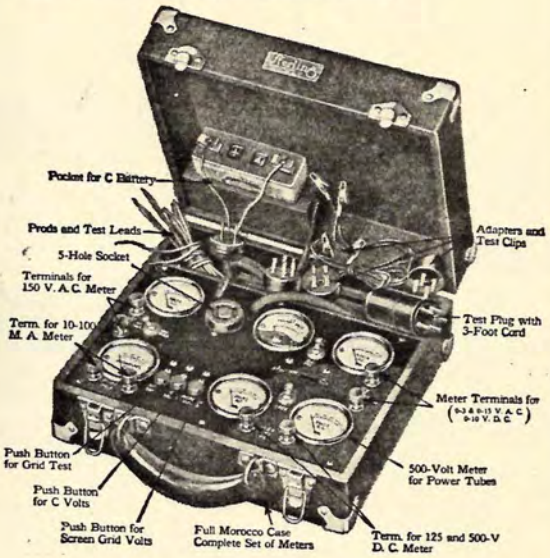
REMO TUBE REACTIVATOR
1925 - $25

(For 99 & 01A Tubes Only)

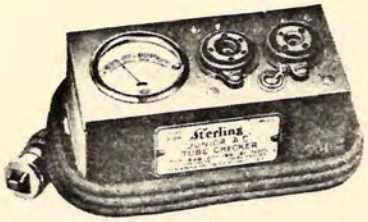
STERLING TEST APPARATUS

R-415 "B" VOLTAGE TESTER - $8

R-96 "B-C" ELIMINATOR $53

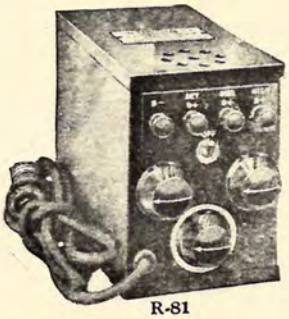

Pocket for C Battery
Prods and Test Leads
5-Hole Socket
Terminals for 150 V. A.C. Meter
Term. for 10-100 M. A. Meter
Adapters and Test Clips
Test Plug with 3-Foot Cord
Meter Terminals for
Push Button for Grid Test
Push Button for C Volts
Push Button for Screen Grid Volts
Full Morocco Case Complete Set of Meters
500-Volt Meter for Power Tubes
Term. for 125 and 500-V D. C. Meter

R-522 TESTER - $68



JR. AC TUBE TESTER

AF OUTPUT XFRMR. $5



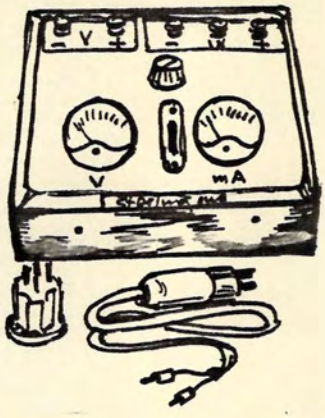
R-81 "A" SUPPLY - $32

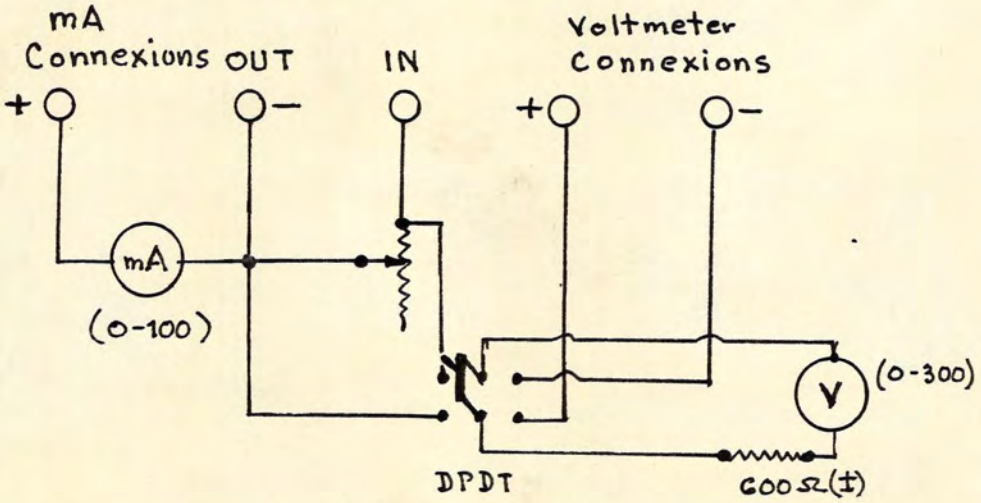
R-403 TUBE TESTER & REJUVENATOR

R-411

R-250 POWER AMPLIFIER $38

STERLING POWER SUPPLY TESTER, R-410
(1927 - $45)





1. When outside posts of mA are used, a rheostat is in series with the mA meter.

2. When connected to (+) and (C-) posts, meter may be used as a separate meter.

3. Current taken by voltmeter is included in mA meter reading.

4. When switch is in "Meters Coupled" position, rheostat is turned to where mA meter reads load on set in mA; voltage which would be obtained is read on voltmeter.

INSTRUCTIONS FOR OPERATING THE STERLING R-403 VACUUM TUBE REACTIVATOR

Caution: Read carefully before attempting to use the reactivator.

The Sterling R-403 Tube Reactivator is designed to reactivate UV and UX 201-A, C, and CX 301-A, UX 200-A, CX 300-A, UX 171, CX 371, UV 199, C 299, UX 199, CX 299, UX 120, and CX 220 tubes.

Before placing a tube in the socket for testing, be sure the lever is in the TEST position. Be careful not to switch lever to HIGH position after reactivation has been started, as this will immediately reduce the filament emission to zero, and make it necessary to repeat the reactivation process.

NOTE: Never allow the lever to remain in HIGH position for more than 30 seconds when the tube is inserted.

NOTE: Disconnect attachment plug from lamp socket when reactivator is not in use.

NOTE: If in testing a tube to determine whether it needs reactivation, when the lever is in the TEST position, the hand on the meter dial flies to the left of zero, this is an indication that the tube has been shorted between the grid and filament. Move lever to CENTER position immediately - otherwise, the meter may be burned out.

NOTE: When testing new tubes (or one which has not been fully aged) sometimes the reading of the FILAMENT EMISSION may slowly decrease if the lever is left in the TEST position longer than necessary to take the reading. Such a condition does not necessarily indicate a defective tube.

NOTE: If, on the other hand, in testing, the emission meter hand goes beyond the 100 marking and maintains its position, it is an indication that the filamant is fairly up to standard. This off-scale position of the meter hand is sometimes caused by abnormally high line-voltage. Sometimes during tests the meter hand will be seen to flutter. This indicates a fluctuating line-voltage. No harm will result to the instrument in either case.

The Sterling Reactivator is designed so that it meets the requirements of high-grade tube makers and cannot in any way injure a tube having a genuine thoriated filament.

TO CONNECT UP THE INSTRUMENT:

(A) Connect the Reactivator to a 110 volt, 60 or 50 cycles lighting current (25 or 40 cycles if specified in the name plate) by inserting plug into a lamp socket, and turn on the current.

The Reactivator operates from house lighting or other circuits of 110 VAC, 50 or 60 cycles frequency, or at 25 or 40 cycles. Be sure your voltage and frequency correspond with that specified on the name plate before attempting to operate the instrument.

TO TEST TUBES:

(B) Insert tube in proper socket (using adapter if becessary). Push switch lever as far as possible to the left of TEST position. Quickly note the reading obtained on the Filament Emission meter, then move the lever slightly away from the TEST position until the meter shows no reading.

TEST READINGS FOR TUBES

For 01A tubes testing lower than 30, reactivation is recommended. Readings from 40 to 50 indicate the tube is in reasonably good condition - probably fully re-activated. Higher readings may be obtained on exception-ally good tubes.

For 99 tubes, readings lower than 10 will justify re-activation. Readings from 15 to 20 on test may be con-sidered good.

For 20 tubes, see below.

TO REACTIVATE:

Insert 01A, 200, 71 tubes in larger socket. For the 99 tubes insert in small socket.

To reactivate 99 tubes, first push tube prongs into reactivator by means of an adapter. Do not use an adapter for 99 tubes in the large socket, as this will burn out the tube.

Only one tube at a time can be tested for total emission or reactivation. Use either the large or small socket, but never insert tubes in both sockets at the same time.

(C) Move switch lever to extreme right position marked HIGH. In this position the filament will burn with a high brilliancy. Time the lever in this position for exactly 30-seconds.

(D) Then move the lever to center position marked MEDIUM and allow the filament to burn from 2 to 10 minutes. During this period occasionally throw the lever to the TEST position and compare the reading of the meter with the test readings given above. If, after the 10 minutes period, emission is not high enough, return the lever to MEDIUM position and continue to burn tube for 2 to 5 minutes longer, chdcking the increase from time to time by momentarily moving the lever to the TEST position. Thus may be repeated as long as the test readings continue to increase, or until a satisfactory emission reading is obtained. Many tubes will reactivate in 2 minutes and if treated further, filament emission will begin to decrease.

(E) If, after buring the tube for as long a period as 15 minutes with the lever at the MEDIUM position, the total emission reading does not build up to the required amount, it is very often possible to improve the reactivation by returning the lever to the TEST position and then moving it back about an eighth of an inch (1/8") from the stop so that there is no longer a meter reading. Allowing such a tube to burn for 10 to 20 min utes with the lever in this position will generally cause a marked increase

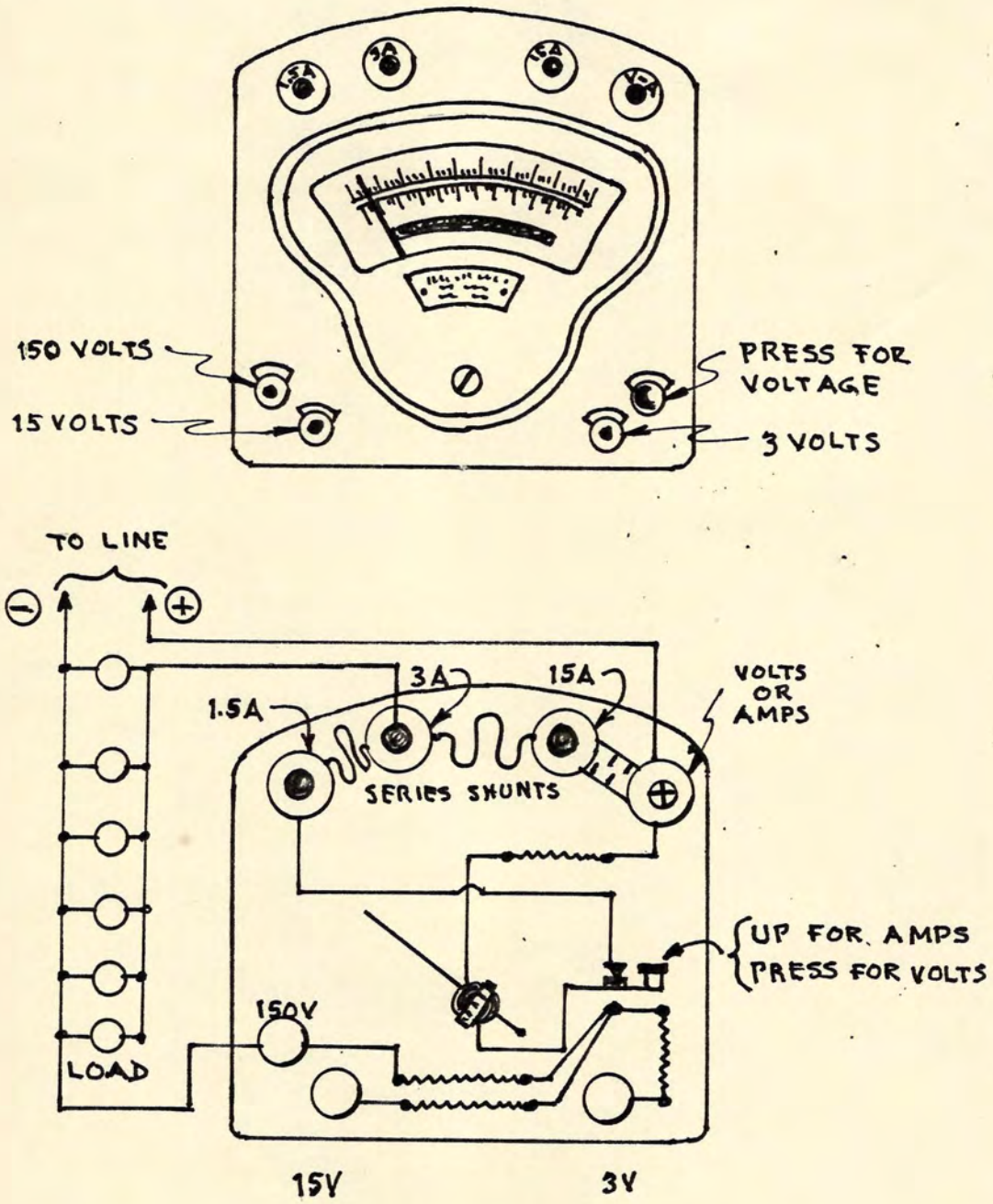
in its total emission.

The 20 3V power tubes may be reactivated as follows, using extreme care and following instructions exactly.

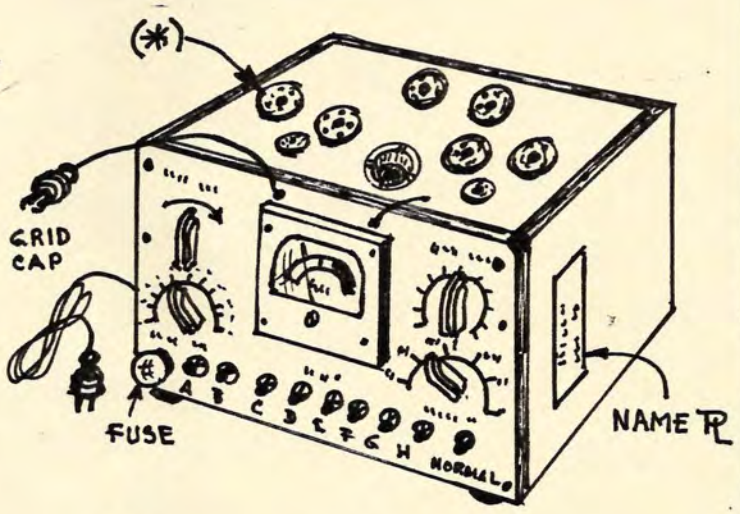
1. Set lever at MEDIUM position.
2. Insert tube in large socket, using spacing adapter.
3. Time for 30 seconds, then move lever to TEST position, slowly, until filament lights up BUT DO NOT MOVE LEVER FAR ENOUGH TO CAUSE METER TO READ!
4. Allow filament to burn for 10 minutes.
5. Tube may be tested by placing it in the small socket with lever in the TEST position.
6, The reading obtained will be as small as for 99 tubes.

THE STERLING MANUFACTURING COMPANY,
2831-53 Prospect Avenue, Cleveland, Ohio, U.S.A.

WESTON Model 280 VOLT-AMMETER
CONNEXION DIAGRAM



WESTON Model 685-3A TUBE-CHECKER - Sht. 1



(*) = Combination Socket For 4~5~6-Prong Tubes.

This particular tube-checker was used extensively by the MILITARY, and a few are still available. On the bottom of the cabinet is a VT listing, in numerical sequence, but not by tube type. While there are several cross-references for converting VT types to conventional tube designations, it has been my experience that not everyone has them, or they are not readily available. Also, it is rather tedious to translate a dozen-odd VT numbers, looking for one that pertains to the vintage tube you have at hand. The following listing is a conversion I have worked out for most of the familiar vintage tubes, which may be checked on this tester. The checker will, of course, test all so-called modern tubes from before, during, and after the Hitler's War. These data, however, are usually available and are not listed here. But if you cannot get access to such data, write to the publisher or Olde Tyme Radio Co., and state the tube series you are interested in. There is no charge.

* * *

"NORMAL" position for all toggle switches is DOWN. The "IN" position is when the switch is thrown to its up position.

Tube:	Fil. Sel.	Tube Sel.	"IN" Position
01A	5	36	BC
10	7	38	BC
10S	6	39	BC
24	1	22	BCF
24A	3	40	BCE
27	3	39	BC
31	2	19	BC
32	2	20	BCE
33	2	24	BCG
34	2	20	BCE
35/51	3	40	BCE (1)
36	6	40	BCE (1)
37	6	39	BC (1)
38	6	39	BCE (1)
39/44	6	41	BCF (1)
41	6	42	BCF (1)
45	3	41	BC
45S	6	41	BC
47	3	41	BCE
46	3	41	BCG
50	7	37	BC
56	3	41	BC (1)
57	3	42	BCEF (1)
58	3	42	BCEF (1)
75	6	41	BE (1)
76	6	39	BC (1)
77	6	41	BCEF (1)
78	6	41	BCEF (1)

WESTON Model 685-3A TUBE-CHECKER, Sht.2

Tube:	Fil. Sel.	Tube Sel.	"IN" Position
80	5	36	B&C
83	5	43	B&C
84/7Z4	6	42	B&C (1)
89	6	40	BCEF
2A5/1619	3	42	BCDG
841	7	38	BC
210T	7	38	BC
1R4/1294	3	32	ABCF
1R5	1	25	BCFG
1S5	1	18	CDF
1T4	1	25	BFG
5V4	5	44	C&F
5U4	6	44	BCGH (2)
5Y3	5	33	C&F
5Z3	5	39	B&C
5Z4	5	44	C&F
6E5	6	36	BCF
6U5/6G5	6	37	BCF
6L6	6	43	BCDE (1)
6V6	6	42	BCD (1)
6L5	6	41	BD (2)
25L6	9	45	C&F
6W5	6	43	B&D (3)

NOTES:

1. Test for "K" leakage by throwing "A" switch IN when tube is hot. All other switches out.

2. Reject point is 16 on the 50-Line arc.

3. B & D must be thrown "IN" simultaneously to check for open elements or short circuits.

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Beyond Rider!

SEE BACK COVER

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